Consortium d'Identification précoce de la Maladie d'Alzheimer - Québec

Neuroimaging Platform Protocol

Revision 1.5

17 February 2016

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Remerciements/Acknowledgments

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While we're at it, our parents as well.

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1. CIMA-Q Neuroimaging Platform MRI protocol overview

Superior image quality is imperative to the success of the CIMA-Q study. To this end, a comprehensive and rigorous MRI protocol has been established to ensure quality control and assurance throughout the acquisition process, at every site.

The MRI protocol is composed of the following steps:

a) Site registration;
b) Site qualification;
c) Site quality control; and
d) Site quality assurance.

Protocol sequences are based on the ADNI study, with additions. They have been closely harmonized between the different vendors and hardware/software configurations in order to maximize commonality. The core protocol used by CIMA-Q includes anatomical imaging (3D volumetric T1-weighted acquisition); cerebrovascular/pathological imaging (T2-weigthed, PD-weighted, FLAIR, and T2* GRE acquisitions); diffusion imaging (30+ directions); and functional connectivity imaging (resting state EPI). This core is common to other, notable studies now underway in Canada, and is accordingly referred to as the *Canadian Dementia Imaging Protocol*. To this core protocol, add-on acquisitions and tasks can be appended. In the case of CIMA-Q, a functional acquisition during a delayed recall memory task has been selected. Further information on the CDIP can be found at www.cdip-pcid.ca .

Regarding quality control, besides harmonizing acquisitions, two phantoms will be used across sites to control scanner-specific variations. First, a human volunteer from the Neuroimaging Platform Coordinating Center will act as a Human phantom, scanned yearly at all sites. Secondly, a geometric phantom, provided by the company VFSC Inc., is used for more regular (i.e. monthly) quality control. It is built from Lego DUPLO® bricks, assembled inside a polycarbonate Nalgene® container and filled with a water solution of 0.15mM/L $MnCL_2$ and 2.8g/L NaCL. Amongst its many advantages, it uses the same *subject* acquisition protocol for distortion correction; and furthermore, accurate positioning of the phantom at the magnetic center of the scanner is not needed – the phantom simply has to cover the field of view where participant data will be acquired.

2. Site Registration

Site/scanner configuration management and tracking is a significant component of quality control and assurance. To this end, each site will be required to register with the CIMA-Q Neuroimaging Platform Coordinating Center. Data regarding current capabilities (e.g. strength, coil) will be collected. It is the responsibility of each Site Coordinator to maintain this information up to date, especially through major and minor upgrades to hardware and/or software. Additional quality control will be required after any upgrade that is deemed to have an impact on image quality.

The initial collection form can be found here: https://fr.surveymonkey.com/r/CIMAQ-Neuroimaging.

The central CIMA-Q Neuroinformatics Platform (LORIS) will be used to maintain the Site Register.

3. Site Qualification

Prior to any CIMA-Q participants being scanned, a site must complete the CIMA-Q Neuroimaging Platform site qualification, which includes two different exams: first, sites will scan the geometric phantom with selected qualification sequences. Secondly, sites will be asked to scan a human volunteer with selected qualification sequences.

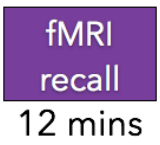
Subsequent to these qualifications scans, the CIMA-Q Neuroimaging Platform Coordinating Center will review both phantom and human scans for adhesion to parameters and scan quality. If the phantom scan does not pass review, your site will be asked to re-scan the phantom after making suggested changes by the quality control team. Otherwise, you will receive an email certifying your site. The same MRI scanner and protocol must then be used for site qualification and all subsequent scans during the course of the CIMA-Q study.

Phantom Scan Qualification Protocol

The protocol to be used will be: Phantom Scan Protocol (Annex 3). It is composed of the following elements:

Human Scan Qualification protocol

The protocol to be used will be: Human Scan Protocol (Annex 3). It is composed of the following elements:



Note that the fMRI recall task is for right-handed participants only!

Acceptance

The quality control team will perform the following measurements on the phantom data:

- Geometrical uniformity: linearity/nonlinearity measurements
- Image contrast: signal and contrast to noise ratio
- System errors

The quality assurance team will perform the following measurements on the human phantom data:

- anonymization
- adherence to protocol parameters
- coverage
- presence of artifacts

A description of the most common acquisition artefacts, and work-arounds, is presented in Annex 7.

The CIMAQ Neuroimaging Coordinating Center will review human and phantom scans and will make recommendations to improve quality, if necessary.

4. Site Quality Control

To ensure scanner stability and scan quality throughout the CIMA-Q Study, each site is required to perform *on going* quality control scans on the geometric phantom using the QC Phantom and Human Phantom protocols.

4.1 Phantom Scan Quality Control Protocol

The protocol to be used will be: Phantom Scan Protocol (Annex 3).
Frequency: phantom scans should be performed in **the first week of each month**.

4.2 Human Phantom Scan Quality Control Protocol

The protocol to be used will be: Human Scan Protocol (Annex 3).
Frequency: human phantom scans should be performed every year. The Neuroimaging Coordinating Center will contact each site at the appropriate time to set an appointment.

4.3 Data Transfer

Each site will send phantom data to the Neuroimaging Platform Coordinating Center via the CIMA-Q Neuroinformatics Platform (LORIS) within 48 hours of completing the scan. Upload is done via the CIMAQ LORIS website (loris.cimaq.ca). For each scan, a Scan Transmittal Form (example given in Annex 5) must be completed by the MRI technician within the LORIS interface at the time of the scan. This will allow the Coordinating Center to track erroneous data, capture errors, or answer queries. A video tutorial demonstrating how to upload data into LORIS will be issued by the Neuroimaging Coordination Center.

4.4 Measurements

The quality control team will perform the following measurements on the phantom and human data:

- Geometrical uniformity: linearity/nonlinearity measurements
- Image contrast: signal and contrast to noise ratio
- System errors
- Artifacts

4.5 Results and Site Notification:

The quality control team will examine each phantom and human data set to ensure that there are no underlying problems with the scanning session, and the scanner has not drifted out of specification. If there are issues to be addressed, those will be tracked within LORIS using the MANTIS Bug Tracking System.

LORIS-related information such as Form descriptions, Labeling of the data, and MANTIS Bug Tracking are described in the CIMA-Q LORIS Data Manual.

5. Site Quality assurance

Every effort should be made to acquire excellent scans on CIMA-Q participants at their first MRI appointment and at all subsequent visits. This prevents the clinical centers from rescheduling additional repeat MRIs for study participants, and saves costs. Sites will only be reimbursed for scans that pass quality control (c.f. section 7 – Billing).

5.1 Human Scan Protocol

The protocol to be used will be: Human Scan Protocol (Annex 3).
It should be noted that the T1w-3D acquisition sequence is the central sequence to be acquired for the CIMA-Q Study. This sequence should always be acquired immediately after the tri-planar scout. Please note the image quality of this scan and re-acquire if necessary before running the rest of the sequences.

5.2 Data Transfer

Each site will send participant data to the Neuroimaging Platform Coordinating Center via the CIMA-Q Neuroinformatics Platform (LORIS) within 48 hours of acquisition (loris.cimaq.ca). It is expected that the psychometrist will collect and transfer the data to the LORIS platform (*cf.* CIMA-Q Neuroimaging Platform Management Protocol). For each scan, a Scan Transmittal Form (example given in Annex 5) must be completed by the psychometrist, with help from the MRI technician if need be, within the LORIS interface at the time of the scan. This will allow the Coordinating Center to track erroneous data, capture errors, or answer queries.

5.3 Measurements

The quality assurance team will perform the following measurements on the participant data:

- anonymization
- adherence to protocol parameters
- coverage
- presence of artefacts

5.4 Acquisition Results and Site Notification

The quality assurance team will examine each scan set for protocol compliance, to ensure that there are no underlying problems with the scanning session, and that the scanner has not drifted out of specification. Acceptance status for the scan will be recorded within LORIS. Any issue with the scan will also be tracked within LORIS, and should corrective actions be required, within the MANTIS Bug Tracking system.

A request for a repeat MRI may be required in the event that the scans are found to be unacceptable due to participant motion or an incomplete MRI acquisition. Repeat exams may also be required if the incorrect scan sequence, orientation, or angulations are used.

Detailed information regarding the reason for the repeat as well as suggestions for improvement will be communicated to the site using the MANTIS Bug Tracking system. When requested, a repeat scan will need to be scheduled within two (2) weeks.

It is imperative to use the CIMA-Q approved acquisition sequence with every participant. Scans rejected by quality assurance, for example with image degradation due to the incorrect scan sequence, orientation, or angulations, will NOT be reimbursed. Rescans will be reimbursed if the correct scan sequence, orientation, and angulations were used.

6. Incidental Findings

6.1 Scanning is not diagnostic and not reviewed

Scanning performed as part of CIMA-Q is not diagnostic, and is not systematically reviewed by a specialist (i.e. radiologist) for diagnostic purposes. This should be made clear during the signing of the consent form. However, during the course of evaluations, incidental findings might be found that should be reported.

6.2 Procedure

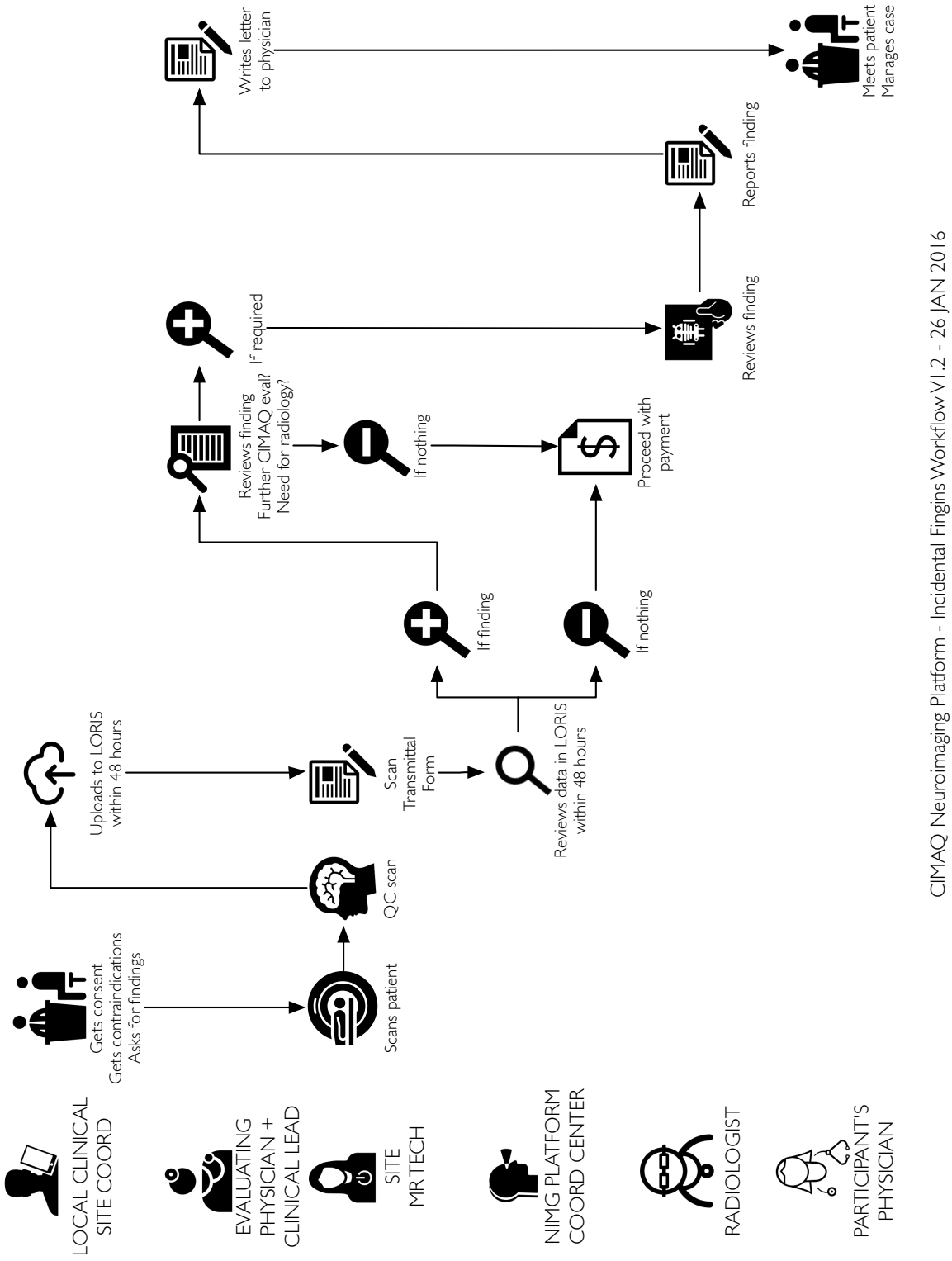
The procedure for review and reporting of incidental findings is highlighted in the figure below.

a) at the clinical screening visit, contraindications to MRI should have been reviewed by the Local Clinical Site Coordinator;
b) at the pre-MR screening interview, a second validation of contraindications to MRI should have been made by the Local Clinical Site Coordinator. Further, known anomalies that might be found upon scanning should have been identified;
c) when scans are performed, the MR technician should review each acquisition for quality control purposes. At this point, she/he may detect an anomaly:
    a. if the incidental finding is life threatening (e.g. hemorraging) then immediate emergency procedures should be followed in accordance with established protocols in place at each site; or
    b. if the incidental finding is non-life threatening, then it should be reported on the Scan Transmittal Form (refer to Annex 5);
d) when scans are received at the Neuroimaging Coordination Center, the MR Coordinator will review each acquisition for quality assurance purposes. Anomalies noted on the Scan Transmittal Form or new incidental findings will be assessed as follows:
    a. if deemed to be within normal parameters, it will be noted in LORIS as part of the quality assurance notes for that acquisition. No further action will be required;
    b. if deemed to be significant:
        i. the Local Clinical Site Coordinator will be notified to identify the Evaluating physician for this participant;
        ii. the Local Clinical Site Coordinator will notify the Evaluating physician and CIMAQ Clinical Lead of the existence of the significant incidental finding. In conjunction, they will decide a) whether to continue CIMA-Q evaluations; and b) whether to evaluate further the finding with a specialist (i.e. radiologist) identified by the Neuroimaging Coordinator;
        iii. if it is deemed that the incidental finding does not need review, this decision will be recorded and no further action will be necessary;
        iv. if a review is deemed to be necessary, then the Neuroimaging Coordinator will ensure that a specialist (i.e. radiologist) reviews the

scan;

1. the scan report will be returned to the Evaluating physician and CIMAQ Clinical Lead;
2. the Evaluating physician will then write a letter to the participant's physician, including the radiologist's report, to appraise her/him of this finding, in order for the participant's physician to inform the patient and take any appropriate action henceforth;
3. if the participant has not provided a name or does not have a personal physician, then the Evaluating physician will contact the participant and manage the finding.

e) All communications will be issued via the MANTISS tracking system, as part of LORIS, to ensure traceability and accountability;
f) All communications will include the CIMAQ PI (S. Belleville); and
g) All important personnel shall have named alternates whenever they are unable to perform their duties (e.g. holidays).


LOCAL CLINICAL SITE COORD
EVALUATING PHYSICIAN + CLINICAL LEAD
SITE MR TECH
NIMG PLATFORM COORD CENTER
RADIOLOGIST
PARTICIPANT'S PHYSICIAN
Gets consent
Gets contraindications
Asks for findings
Scans patient
QC scan
Uploads to LORIS within 48 hours
Scan Transmittal Form
Reviews data in LORIS within 48 hours
If finding
If nothing
Reviews finding Further CIMAQ eval? Need for radiology?
If nothing
Proceed with payment
If required
Reviews finding
Reports finding
Writes letter to physician
Meets patient Manages case
CIMAQ Neuroimaging Platform - Incidental Fingins Workflow V1.2 - 26 JAN 2016

7. Scanner change protocol

Every effort should be made to maintain the scanner in the same configuration as that used during the site acceptance. However, software upgrades, hardware changes due to repair or novelty, will inevitably happen during the course of the project.

Each major software and/or hardware change needs to be reported to the Neuroimaging Platform Coordinating Center. A decision will then be taken regarding the necessary steps to undertake to maintain the stability in the acquisitions throughout the duration of CIMA-Q. For example, it could be the case that sites are asked to keep scanning participants on what has become older equipment, in order not to disrupt the protocol. Other alternatives include scanning the geometric phantom before and after the upgrade.

8. Billing

Reimbursement of scan/scan time will be done once the Billing Coordinator receives an invoice from the Site. **Billing for scan/scan time will be done on an individual basis, i.e. each scan will be assessed for reimbursement. Scans that fail to meet the quality standards of CIMA-Q will not be reimbursed.**

These quality standards are laid out in the protocol detailed in Annex 3, especially section 2.3.4; example artefacts and work-arounds are provided in Annex 7. Broadly speaking, it is expected of the site MR technologist (and not the psychometrist) to ensure that the MRIs are of the highest possible quality, following the detailed protocol provided. Should the scans prove otherwise, they may not be reimbursed; unless, that is, valid reasons are transmitted to the Neuroimaging Coordinator via the Scan Transmittal Form in LORIS. The latter may include non-compliance on the part of participants, excessive movement disorders, and the like. Every effort should be made however to capture the basic acquisitions required by the project (i.e. 3D T1-weighted and T2 FLAIR).

It is imperative that each invoice list, in some form, the CIMA-Q participant number (either the DCCID or PSCID from LORIS). This will allow the individual tracking of scans performed for each site, within LORIS, and through the quality assessment chain, to reimbursement.

The invoice should also list the quality control time for the geometric phantom.

Invoices should be made to the order of:

C/O Simon Duchesne
Projet 611 - CIMAQ
Centre de recherche de l'Institut universitaire en santé mentale de Québec
2601 de la Canardière, Bureau F-3582
Québec, QC G1J2G3

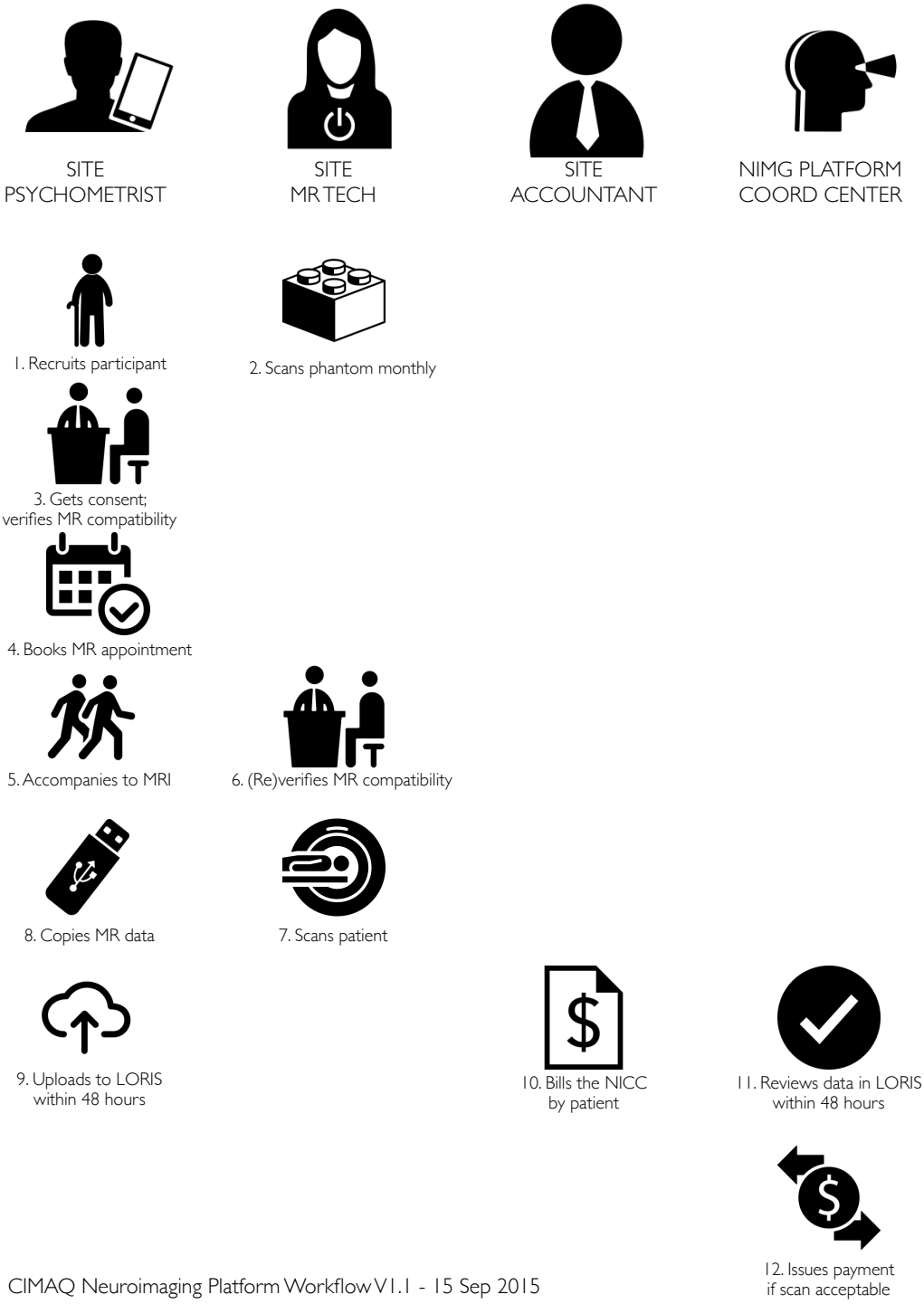
Invoices should be sent to:

C/O L. Maynard
Centre de recherche de l'Institut universitaire en santé mentale de Québec
2601 de la Canardière, Bureau F-3568
Québec, QC G1J2G3

Contracts have been established between the hosting institute (IUSMQ) and each site.

Site	Information
CIMAQ Coordination	IUSMQ - Contractual officer: Lyne Tousignant lyne.tousignant@institutsmq.qc.ca IUSMQ – Coordinator: Lynn Maynard lynn.maynard@crulrg.ulaval.ca
UNF	Francine Bélanger Contract #4460
CHUS	Martin Lepage Contract #4462
CINQ	Cécile Thomassin IRM Québec Contract#4461 Isabelle Chouinard IUSMQ
MNI	Hélène Day Contract #4459

9. Summary of responsibilities



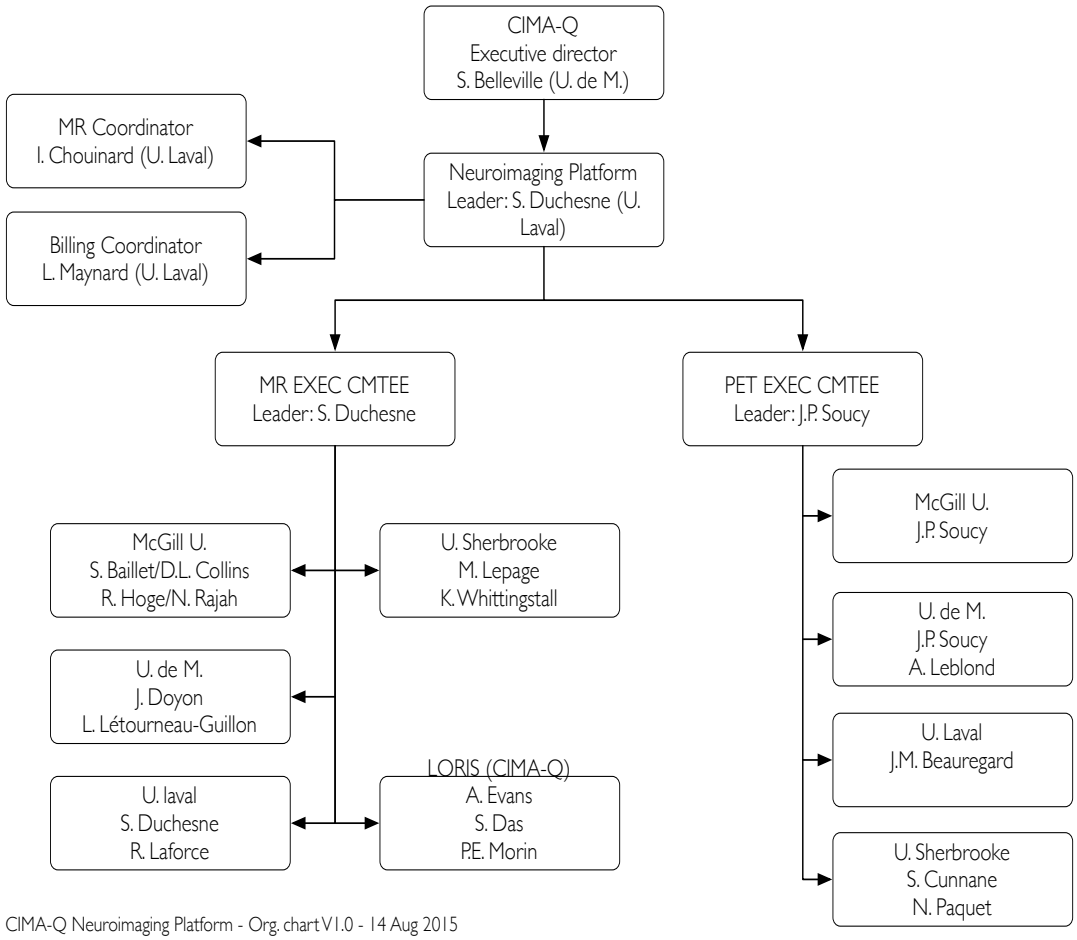
CIMAQ Neuroimaging Platform Workflow V1.1 - 15 Sep 2015

ANNEXES

Annex 1: CIMA-Q Sites

Code	Location	Institution	Site	PI	Head MR Tech	Head Psycho.
Qualified scanning sites						
01	Montreal	U. McGill	MNI (BIC)	S. Baillet sylvain.baillet@mcgill.ca	mrtechs.neuro@mcgill.ca	C. Fouquet celine.fouquet@criugm.qc.ca
02	Montreal	U. de M.	CRIUGM (UNF)	J. Doyon julien.doyon@umontreal.ca	C. Hurst carollyn.hurst@criugm.qc.ca	C. Fouquet celine.fouquet@criugm.qc.ca
03	Quebec	U. Laval	CINQ	S. Duchesne Simon.duchesne@fmed.ulaval.ca	I.Chouinard isabelle.chouinard@crulrg.ulaval.ca	A.Parent andreanne.parent.2@ulaval.ca
04	Sherbrooke	U. Sherbrooke	CIMS	M.Lepage Martin.Lepage@USherbrooke.ca	P. Fournier pfournier.chus@ssss.gouv.qc.ca	D.Lorrain dominique.lorrain@usherbrooke.ca
Qualified non-scanning sites						
-	Montreal	CHUM	Notre-Dame	L. Létourneau laurent_letg@hotmail.com		
-	Montreal	Concordia	PERFORM	J. Steffener jason.steffener@concordia.ca		
-	Montreal	McGill	Douglas	N. Rajah mnrajah@gmail.com		

Annex 2: CIMA-Q Neuroimaging Platform Organizational Chart



Annex 3: MRI Protocol

This document has been created to:

- Specify phantom acquisition procedures
- Specify human acquisition procedures:
    - Equipment to be used
    - Scanning instructions
    - Documents to send
    - Sending instructions

The CIMA-Q Neuroimaging Coordination Center expects than every site involved in CIMA-Q will read and understand instructions in this protocol.

If you have any questions or problems regarding the acquisition aspects of this protocol please contact: Isabelle Chouinard, t.i.m. (isabelle.chouinard@crulrg.ulaval.ca)

If you have any questions or problems regarding the data transfer to LORIS for this protocol please contact: Pierre-Emmanuel Morin (pierre-emmanuel.morin@criugm.qc.ca)

If you have any questions or problems regarding individual participants please contact the study coordinator at your referral site.

1.Procedure: Phantom Scan Protocol

1.1 GEOMETRIC Phantom

1.1.1 Scan instructions

Phantom scans should be performed **every month**.

1.1.2 Coil / Hardware

Scanning in CIMA-Q must be done on a 3.0 Tesla magnet from either GE Healthcare; Philips Medical Systems; or Siemens Healthcare.

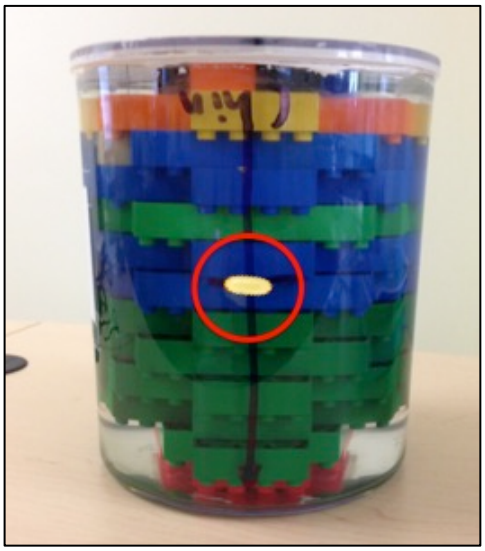
Use the same head coil as used in the site qualification. It should be an 8-channel coil (or more, for some specific sites). The coil used for the phantom scan must be kept for human scanning.

1.1.3 Positioning

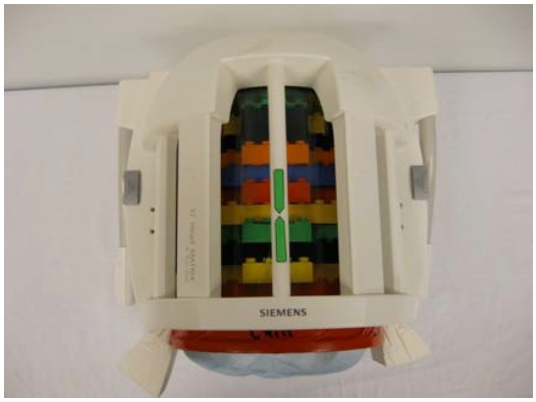
To achieve a reproducible position follow these instructions. Depending of the coil used, the inferior part of the phantom can exceed up to the half of its length. Adjust the phantom to have its structure as more as it can inside the coil.

Positioning (12-channel head coil)

1) At first, place a vitamin E gel on the black cross on the surface of the phantom.



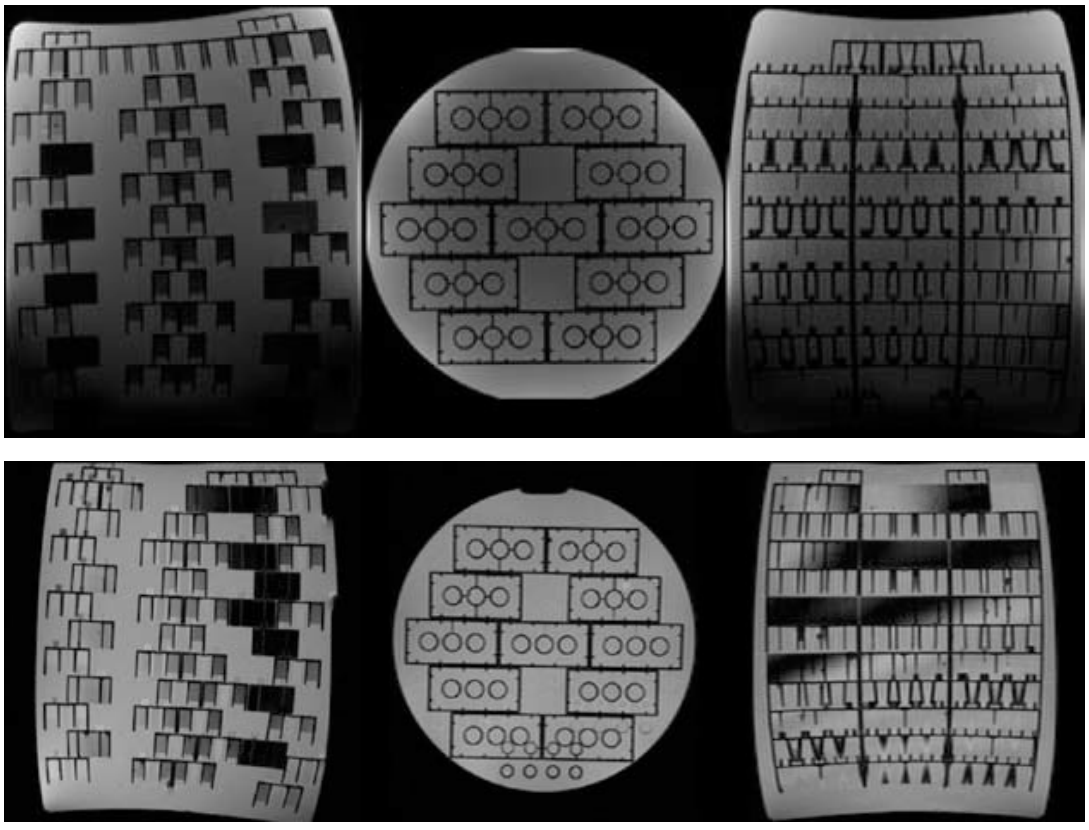
2) Place the phantom on the headrest, with the larger end marked "Chin" on the outside. Rotate the phantom, so that the "Chin" writing is facing up. Ensure that the phantom is placed as deeply as possible into the coil. After closing the coil, a minimal portion of the phantom will stick out by ~ 10cm. Align the phantom so that the arrow on the larger side is looking straight up.



3) Use some kind of padding to approximately align the phantom with the horizontal line (the phantom shell is slightly conical, so the upper side will be slightly inclined). Rotate the phantom so that the "Chin" label is facing up and the arrow on the larger side is pointing straight up.

4) Before the acquisition, align the black cross on the surface of the phantom container with the lasers. The phantom may have to be restrained to prevent shifts during the acquisition.

5) Typical image on the localizer: notice heavy signal drop-off in the bottom. The whole phantom must be scanned.



Typical view on the localizer, when using the standard (12 channel) head coil.

1.1.4 Sequences

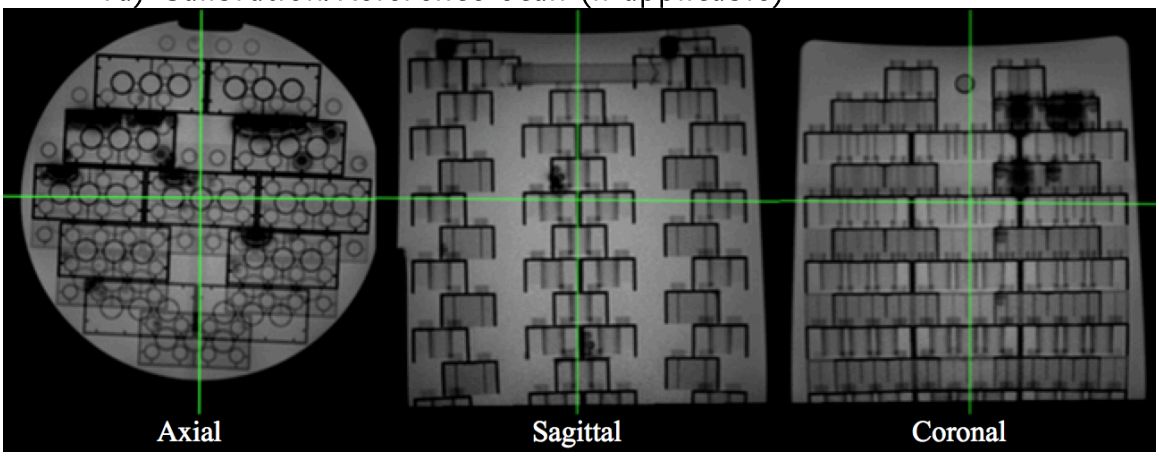
> No manual adjustments should be made to this protocol.
> Refer to spreadsheet in Annex 4 for detailed parameters.
> All sequences must be performed in straight orientation.

Use the exam card named *CIMAQ-Phantom* imported by the CIMA-Q qualification team. Exam cards are also available on the CDIP-PCID website (www.cdip-pcid.ca). If a new Examcard version is available, an email will be sent to the site MR coordinator. Make sure that the latest version of the protocol is updated on the scanner.

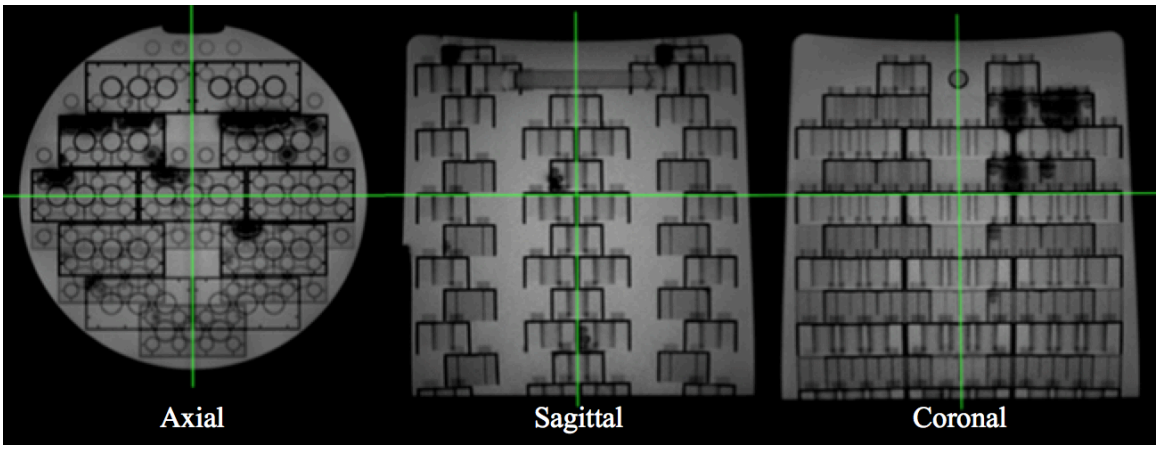
1) Localizer

Run a localizer and make sure the phantom is positioned correctly in the head coil (i.e. without angulation in any plan). If necessary, make adjustments and rescan a localizer. DO NOT SCAN THE PHANTOM UNTIL IT IS WELL POSITIONED.

1a) Calibration/Reference Scan (if applicable)



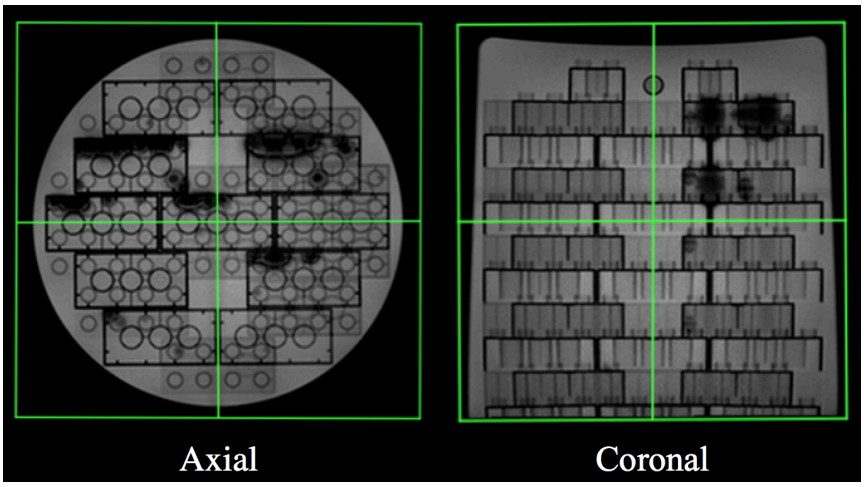
3-Plane Localizer - Phantom need to be replaced correctly.



3-Plane Localizer – Phantom well positioned.

2) QC Phantom 3D-T1w

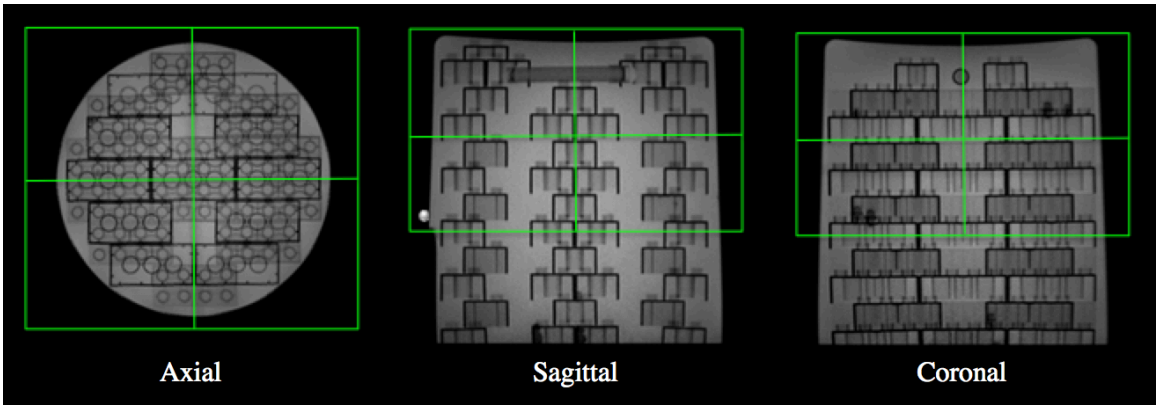
- Straight sagittal orientation – DO NOT OBLIQUE ACQUISITION BOX IN ANY PLAN



Positionning of 3D MP-RAGE / IR-SPGR

3) QC Phantom PD/T2 – Superieur

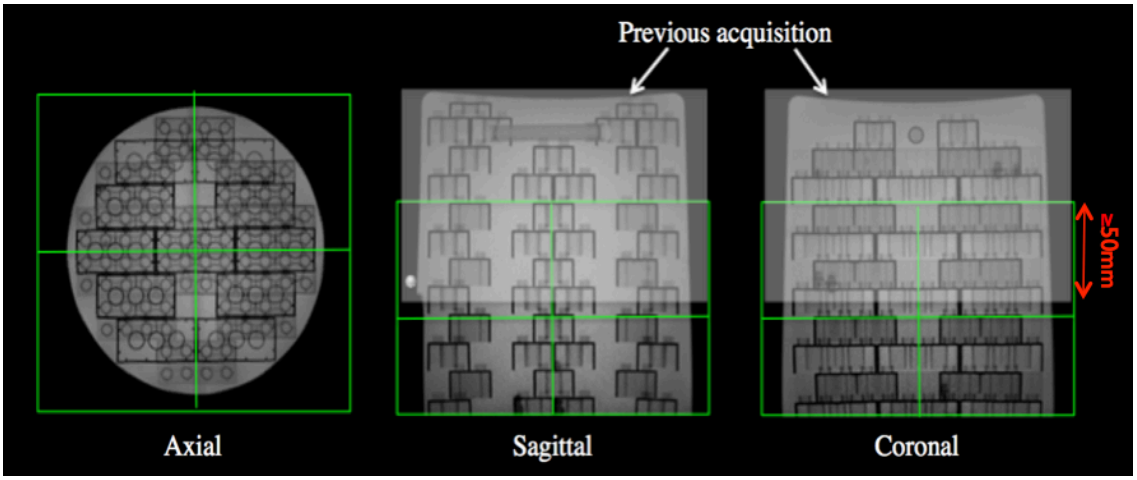
- This sequence must cover superior side of the phantom to vitamin E softgel.
- Straight axial orientation – DO NOT OBLIQUE ACQUISITON BOX IN ANY PLAN



3-Plane Localizer – Superior planification for PD/T@ Ajouter une flèche démontrant la gellule

4) QC Phantom PD/T2 – Inferior (for Siemens and GE only)

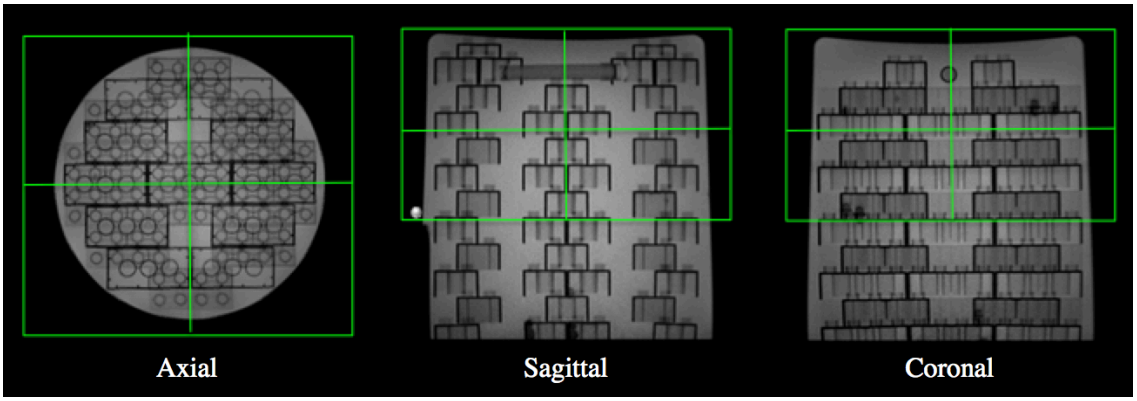
- Second scan must cover vitamin E softgel to inferior part of the phantom.
- Take notice that a minimum overlap of 50mm should be done between those two acquisitions (*see images below*)
- Philips system: Do not acquire this sequence



3-Plane Localizer – Inferior planification for PD/T2

QC Phantom BOLD

- This sequence must cover superior side of the phantom to vitamin E softgel.
- Straight axial orientation – DO NOT OBLIQUE ACQUISITON BOX IN ANY PLAN



3-Plane Localizer – BOLD planification

1.1.5 Phantom naming convention

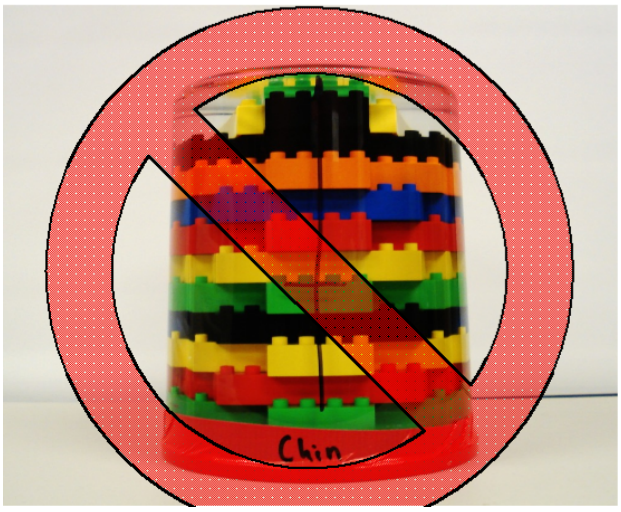
Each set of phantom MRI data transferred to Neuroimaging Platform Coordinating Center via the CIMA-Q Neuroinformatics Platform (LORIS) will be identified by a name according to the ID study given by the local coordinator site. Refer to the LORIS Manual for details. Phantom ID must always be added in the MR in this way: **PSCID_DCCID_PXX.** Where "PXX" must be replaced by session's number; first (P01), second (P02), third (P03), fourth (P04), etc…

Site	Geometric Phantom ID - PSCID_DCCID_PXX
CISM	1020201_469114_PXX
CINQ	1030201_448664_PXX
CRIUGM	1050201_342831_PXX
MNI	1060201_257128_PXX

1.1.6 Phantom storage

Manipulate it very carefully. Make sure that it won't roll or fall when it is stored. There is a technical information document in Annex 6. Each site is expected to review the information contained in this file before using the phantom. Do not scan the phantom if damaged. Contact the Neuroimaging Coordinating Center for any issues with your phantom.

Store in upright position



Do NOT store upside down or on the side

1.2 HUMAN Phantom

Procedures for human phantom scans are similar to those of participants, and will be addressed in the next section.

1.2.1 Human phantom naming convention

Each set of human phantom MRI transferred to Neuroimaging Platform Coordinating Center via the CIMA-Q Neuroinformatics Platform (LORIS) will be identified by a name according to the ID study given by the local coordinator site. Refer to the LORIS manual for details. Human phantom ID must always be added in the MR in this way: PSCID_DCCID_PXX. Where "PXX" must be replaced by session's number; first (P01), second (P02), third (P03), fourth (P04), etc…

Site	Human Phantom ID - PSCID_DCCID_PXX
CISM	1020101_874301_PXX
CINQ	1030101_470163_PXX
CRIUGM	1050101_442985_PXX
MNI	1060101_491836_PXX

2.Procedure: Human Scan Protocol

2.1 MRI preparation:

2.1.1 Coil / Hardware

Use the same coil, hardware and software as used for the monthly geometric phantom scan.

2.1.2 Contraindications

MRI safety precautions must be taken to avoid any risk for participants. All the points below are absolute contradictions:

- Pacemaker, pacing wires, LCD (implantable cardioverter defibrillator)
- Brain aneurysm clips
- Cochlear, ethologic or other ear implant / surgery
- Severe claustrophobia
- Injury to the eye involving a metallic object or fragment
- Injured by a metallic objet or foreign body

Other indications exist which are related to discomfort during or after scanning. Each site is asked to follow its own protocol and conform to the local Ethics committee guidelines.

2.1.3 Procedure

Scanning responsibility is first and foremost a local, site responsibility. Section 8 is an overview of the various responsibilities associated with scanning within CIMAQ. Salient portions related to the Technical Protocol are discussed below.

The site psychometrist will be the prime point of contact for the recruitment, preparation and contact with the participant. As such, she/he is expected to travel to the MR scanning site, and facilitate the scanning of the participant. He/she may be expected to enter the MR suite, close to the magnet, or even within the security lines. Therefore, each psychometrist should complete the MRI safety training (theory, video and post-test), provided by the coordinating psychometrists.

The site psychometrist will fix an appointment time for the MR scan. He/she will accompany the participant at the MR suite.

The participant is invited to remove any clothes or things with metal (dentures, hair clips, combs, earrings, necklaces, ect) and wear a hospital gown.

Participants must be screened for MRI contraindications by the MR technologist. If everything is in order and there is no contraindication, the MR technologist can proceed.

To make sure the participant knows what to expect during the exam, the MR technologist has to explain the scan procedure. If the participant has any questions about the study goal, organization or anything else related with the study, the MR technologist must refer to the psychometrist.

Sedation during MR scan is not offered for this protocol. Participants uncomfortable with MRI scans should not be included. If a participant is too uncomfortable and refuses to complete the scan without sedation, please refer to the psychometrist.

When the activation task is needed, specific materials (i.e. projector, answer button, screen, computer with ePrime, mirror) should be set before the scan begin. For participants with vision problem, corrective lenses (MR compatible) must be provided. Once the participant is installed in the scanner, make sure the screen is entirely seen by him/her. The participant shouldn't need to move his/her head to see the screen. If it is the case, replace the mirror correctly. Before starting scan, make a test to see if the answer bottom works.

2.1.4 Participant Naming Convention

Please enter the participant ID into the scanner following the CIMA-Q LORIS procedure. The real name of the participant should not appear anywhere. Note that participant ID provided by the psychometrist must always be registered is this way: PSCID_DCCID_V03. No image should be sent to the local archival system; they will be extracted via USB to upload into LORIS 48 hours after the acquisition.

2.2 MRI Acquisition

2.2.1 Procedure

A stereotactic marker must the place on the participant's **right** temple before positioning the participant's head in the coil. For that, use a Vitamin E softgels.

Ear protection must to be provided to the participant. It could be headphone or ear plugs.

It is important to place the head in the same manner for each and every exam. If possible, sponges should be insert along the sides of the head and Velcro strap be placed on the forehead.

Place a support under the legs to stabilize the participant. Everything must be done to minimize movement during scanning. Inform the participant the importance of keeping head immobile throughout the examination.

2.2.2 Head positioning

The crucial point is the positioning. There should not be a rotation of the head in the left-right plan.

2.2.3 Sequences

No manual adjustments should be made to this protocol.
Do not change the name of the sequences in the scanner.
Refer to spreadsheet in Annex 4 for detailed parameters.
Whole-brain coverage is requested for all sequences.

The CIMA-Q study uses the Canadian Dementia Imaging Protocol, which consists in a core protocol of six sequences, to which CIMA-Q adds a functional imaging task. Sequences must be done following this order:

1. Localizer
   1a) Calibration/Reference Scan (if applicable)
2. Sagittal T1w-3D
3. Oblique axial PD/T2-Dual Echo
4. Oblique axial T2-FLAIR
5. Oblique axial T2 Star
6. Oblique axial DTI Scan
7. Oblique axial Connectivity fMRI
8. Oblique axial activation task –fMRI (if required)

1) Localizer scan
1a) Calibration/Reference Scan (if applicable)

Perform a quick acquisition in 3 orthogonal planes for anatomical orientation. The entire head and skull should be in the field of view.

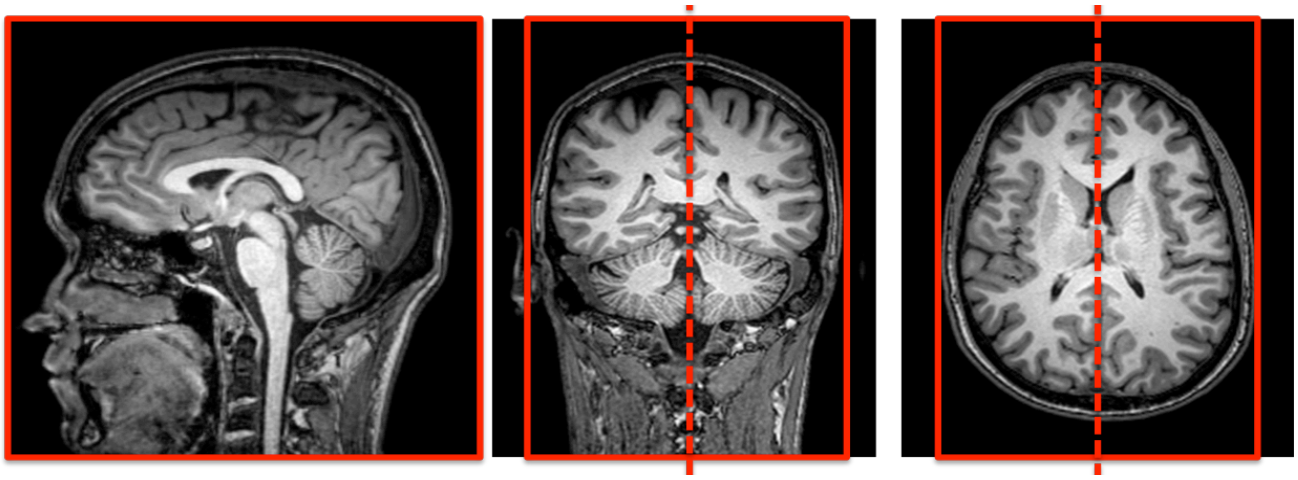
2) T1-w 3D Sagittal MP-RAGE/IR-SPGR/TFE

Orientation

Sagittal. Slight obliquity of the box is allowed to compensate head tilt of participant. Prescribe slices left to right.

Positioning stack

Use the tri-planar scout to position the acquisition box. Make sure to get full head coverage. The skull must be included superiorly and laterally. The field of view will cover entire brain from the bottom of the cerebellum to the vertex. In the anterior/posterior plane the nose should also be included otherwise image folding into the back of the brain will result and the exam may not be usable for the study. Scan will be acquired in a sagittal orientation using an accelerated factor. Please see the images below and use it as a guide to correctly position the acquisition box. If extra sagittal slices are necessary to achieve this coverage please acquire those slices and note it in comment on *Scan Transmittal form*.



Sagittal planning including nose and posterior cortical bone to avoid wrapping. Coronal and axial planning, align with the interhemispheric fissure.

The following sequences are all positioned in an identical oblique axial scans:

3) Axial PD/T2-Dual Echo

4) Axial T2 – Flair

5) Axial T2*

6) Oblique axial DTI Scan

7) Connectivity fMRI (Participant should have eyes OPEN)
   Participant Instruction: Please instruct to keep their eyes open during the entire scan. You can instruct them to focus on a cross on the screen.

Also remind the participants of the importance of holding their head still for the entire scan.

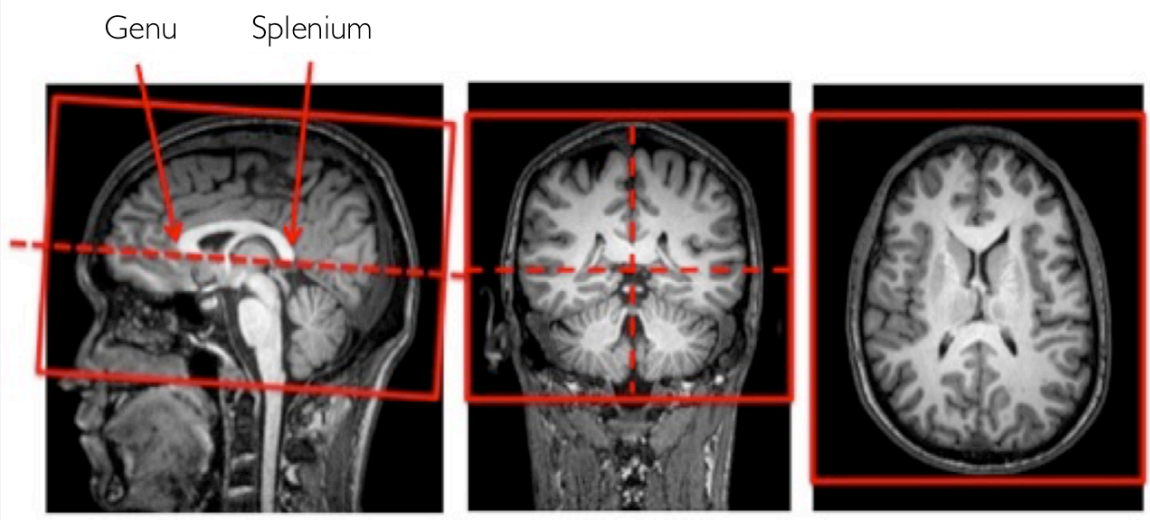
Orientation

Axial oblique plane align with the **lower part of genu and splenium of corpus callosum**. Prescribe slices inferior to superior. Make sure than angulation is the same for PD-T2 / Flair / T2*/ DTI and fMRI.

Positioning stack

Positioned next sequences from T1w-3D. Make sure to get full brain coverage wherever possible. The acquisition stack should be placed just above the most superior point in the brain and fully cover the cerebellum as well as the brain in the lateral and the anterior to posterior planes. Scan will be acquired in an oblique axial orientation using an accelerated

factor. Please see the images below and use it as a guide to correctly positioned the acquisition box. If extra axial slices are necessary to achieve this coverage please acquire those slices and note it in the *Scan Transmittal Form* when uploading in LORIS.

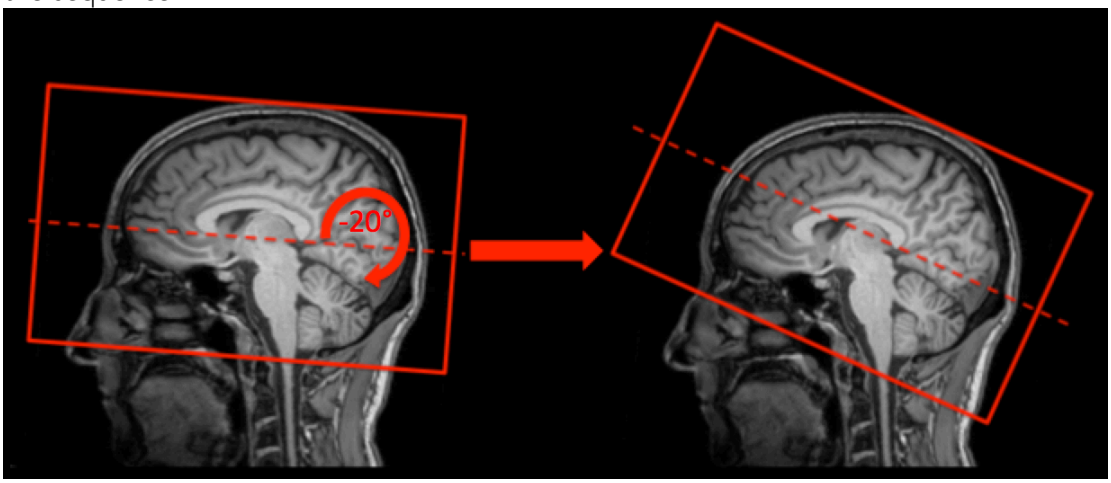


Sagittal planning aligned with genu and splenius of corpus callosum. Coronal planning aligns with longitudinal cerebral fissure. Include cortical bone in lateral.

8) Oblique axial activation task fMRI (if required)

Positioning stack

Align acquisition box with the **lower part of genu and splenium of corpus callosum** and make an extra angulation of 20° clockwise. (See images below). Before starting the scan, let the psychometrist recap the instructions of the task (i.e memorise the images and their position, push the answer button each time images appear on the screen). When sequence is planned, technologist waits for the signal of the psychometrist to start the sequence.



2.2.4 MRI Scan Information and Quality

During the exam, the MR technologist will note any occurring problem or change, including if scans were not well acquired due to participant motion or non-compliance with scanning.

Every effort should be made to comply with the protocol. By virtue of experience and knowledge, it is considered the responsibility of the MR technologist, and not the psychometrist, to acquire high-quality MRIs, suitable for research purposes. Acquisitions that are clearly non-compliant with the protocol, without stated reasons, will not be reimbursed.

Should the MR technologist notice that some acquisitions are problematic, they should be re-acquired immediately. In particular, the following sequences must be acquired:

- 3D T1-weighted ; and
- T2 FLAIR.

This may mean that some later elements of the core protocol not be performed, e.g. connectivity fMRI.

All of the scans should be uploaded in LORIS, alongside a description of the problem and solutions attempted in the *Scan Transmittal Form*. It is based on this information that the MRI Coordinator will issue the recommendation to accept/deny reimbursement.

2.3 MRI Post-Acquisition

2.3.1 Clinical reads

CIMA-Q MRIs should not be locally interpreted.

2.3.2 Incidental findings

No diagnostic will be done by CIMA-Q. If a life-threatening abnormality is detected, take immediate medical actions. If non-threatening, please comment it (i.e approximate size, region, shape) on the *Scan Transmittal Form* within LORIS. The quality control team will review images and take further actions as per Section 6 of this Manual.

2.3.3 Archive procedures

At the end of the exam, copy all sequences on the USB key provided to the psychometrists. Review the key to ensure that all data have been included. Collect the information from the scan session. We recommend not to delete your scan from your system until it is uploaded in LORIS and accepted by the Quality control team.

Every MRI (both human and phantom) for the CIMA-Q Study must be transferred to LORIS within 48 hours of scan. Psychometrists are tasked to upload the images in LORIS, filling out the Scan Transmittal Form at the same time.

The MRIs will be reviewed by the Neuroimaging Coordination Center quality control team within 48 hours of upload. Results will be recorded in LORIS; any issues arising will be captured in the MANTIS Bug Tracking System.

Annex 4: Parameters and exams card

Exams card

Exam card for Philips and Siemens at 3.0T are available on the CDIP website.
www.cdip-pcid.ca

PDF output for GE at 3.0T are also available on the CDIP website.

Parameters *(see following pages)*

1. Geometric Phantom Parameters

Sequence - T1w-3D				
Study	**CDIP - PCID / GEOMETRIC PHANTOM v1.0**			
Vendor	**GE**	**Philips**	**Philips**	**Siemens**
Field Strength	**3.0T**	**3.0T**	**3.0T**	**3.0T**
Model	**Discovery**	**Ingenia**	**Achieva**	**Trio**
Version	23	R5	3.2.1	17
Sequence Name	3D FAST SPGR	3D TFE	3D TFE	3D MP-RAGE
Imaging Options	IrP - Asset	Fast (Sense)	Fast (Sense)	iPat
Pulse Timing				
TE (ms)	min full (2.932)	shortest (3.3)	shortest (3.3)	2.98
TR (ms)	min (6.66)	shortest (7.3)	shortest (7.3)	2300
Flip Angle (°)	11	9	9	9
TI (ms)	400	945	945	900
Scan Range				
FOV (in-plane) (mm)	256 x 256	256 x 248	256 x 248	256 x 256
Slice thickness (mm)	1	1	1	1
Gap between slices (mm)	0	0	0	0
No. Slices	**224**	**224**	**224**	**224**
Acquisition				
Orientation	Sagittal	Sagittal	Sagittal	Sagittal
Matrix size	256 x 256	256 x 248	256 x 248	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	2	2	2
Fold-Over direction	AP	AP	AP	AP
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1
Other				
Fat Suppression	None	None	None	None
Bandwidth	31.25kHz	228 Hz/px	228 Hz/px	240 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time+	00:30	00:30	00:30	00:30
Scan Time	08:00	08:00	08:00	08:00
Total Time (min)	08:30	08:30	08:30	08:30
Comments:	Tested 24-JUN-14	Tested 23-OCT-14	Tested 11-JUN-14	Tested 20-MAY-14

Sequence - DUAL PD/T2				
Study	**CDIP - PCID / GEOMETRIC PHANTOM v1.0**			
Vendor	**GE**	**Philips**	**Philips**	**Siemens**
Field Strength	**3.0T**	**3.0T**	**3.0T**	**3.0T**
Model	**Discovery**	**Ingenia**	**Achieva**	**Trio**
Version	23	R5	3.2.1	16
Sequence Name	FSE	TSE	TSE	TSE
Imaging Options	EDR, Asset	Sense	Sense	iPAT
Pulse Timing				
TE (ms)	min full (8.68) / 85	13/100	13/100	10/91
TR (ms)	3000	3000	3000	3000
Flip Angle (°)	125	90	90	165
TI (ms)	-	-	-	-
Scan Range				
FOV (in-plane) (mm)	240 x 240	240 x 240	240 x 240	240 x 240
Slice thickness (mm)	3	3	3	3
Gap between slices (mm)	0	0	0	0
No. Slices	**48**	**48**	**48**	**48**
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	256 x 256	256 x 254	256 x 254	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	1.7	2	2
Fold-Over direction	RL	RL	RL	RL
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
Other				
Fat Suppression	Fat Sat	Fat Sat	Fat Sat	Fat Sat
Bandwidth	19.23 kHz	211 Hz/px	222 Hz/px	181 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time	00:30	00:30	00:30	00:30
Scan Time	02:43	06:12	05:24	05:17
Total Time (min)	03:13	06:42	05:54	11:34
Comments:				
	Phase FOV 0.75	Set parameter "image filter" at Weak		

For Siemens ans GE only: Acquisition must be done twice. First one from superior part and a second to cover inferior part. Refer to technical manuel for details.

Sequence - fMRI				
Study	**CDIP - PCID / GEOMETRIC PHANTOM v1.0**			
Vendor	**GE**	**Philips**	**Philips**	**Siemens**
Field Strength	**3.0T**	**3.0T**	**3.0T**	**3.0T**
Model	**Discovery**	**Ingenia**	**Achieva**	**Trio**
Version	22	R5	3.2.3	17
Sequence Name	fMRI EPI	FFE EPI	FFE EPI	fMRI EPI
Imaging Options	EDR,Fast Filtered, "eyes open"	CLEAR, SENSE, "eyes open"	CLEAR, SENSE, "eyes open"	"eyes open", iPat
Pulse Timing				
TE (ms)	30	30	30	30
TR (ms)	2400	2110	2110	2110
Flip Angle (°)	70	70	70	70
TI (ms)	-	-	-	-
Scan Range				
FOV (in-plane) (mm)	224 x 224	224 x 224	224 x 224	224 x 224
Slice thickness (mm)	3.5	3.5	3.5	3.5
Gap between slices (mm)	0	0	0	0
No. Slices	**40**	**40**	**40**	**40**
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	64 x 64	64 x 63	64 x 64	64 x 64
Voxel size [L/R x A/P x I/S] (mm)	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	2.1	2	2
Fold-Over direction	AP	AP	AP	AP
Reconstruction				
Matrix size	64	64	64	64
Voxel size [L/R x A/P x I/S] (mm)	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5
Other				
Fat Suppression	Fat Sat	Fat Sat. SPIR	Fat Sat. SPIR	Fat Sat.
Bandwidth (Hz/Px)	n/a	48.6	2441	2442
Number of acquisitions	**100**	**100**	**100**	**100**
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time+	00:30	00:30	00:30	00:30
Scan Time	04:00	04:00	04:00	04:00
Total Time (min)	04:30	04:30	04:30	04:30
Comments:				
		Please set parameter "dynamic stabilization" at : enhanced		

1. Human Parameters

Sequence - T1w-3D				
Study	CDIP – PCID v3.7			
Vendor	GE	Philips	Philips	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio
Version	23	R5	3.2.1	17
Sequence Name	3D FAST SPGR	3D TFE	3D TFE	3D MP-RAGE
Imaging Options	IrP - Asset	Fast (Sense)	Fast (Sense)	iPat
Pulse Timing				
TE (ms)	min full (2.932)	shortest (3.3)	shortest (3.3)	2.98
TR (ms)	min (6.66)	shortest (7.3)	shortest (7.3)	2300
Flip Angle (°)	11	9	9	9
TI (ms)	400	945	945	900
Scan Range				
FOV (in-plane) (mm)	256 x 256	256 x 248	256 x 248	256 x 256
Slice thickness (mm)	1	1	1	1
Gap between slices (mm)	0	0	0	0
No. Slices	180	180	180	192
Acquisition				
Orientation	Sagittal	Sagittal	Sagittal	Sagittal
Matrix size	256 x 256	256 x 248	256 x 248	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	2	2	2
Fold-Over direction	AP	AP	AP	AP
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1	1 x 1 x 1
Other				
Fat Suppression	None	None	None	None
Bandwidth	31.25kHz	228 Hz/px	228 Hz/px	240 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time+	00:30	00:30	00:30	00:30
Scan Time	04:52	06:20	06:17	05:21
Total Time (min)	05:22	06:50	06:47	05:51

Sequence - DUAL PD/T2				
Study	CDIP – PCID v3.7			
Vendor	GE	Philips	Philips	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio
Version	23	R5	3.2.1	16
Sequence Name	FSE	TSE	TSE	TSE
Imaging Options	EDR, Asset	Sense	Sense	iPAT
Pulse Timing				
TE (ms)	min full (8.68) / 85	13/100	13/100	10/91
TR (ms)	3000	3000	3000	3000
Flip Angle (°)	125	90	90	165
TI (ms)	-	-	-	-
Scan Range				
FOV (in-plane) (mm)	240 x 240	240 x 240	240 x 240	240 x 240
Slice thickness (mm)	3	3	3	3
Gap between slices (mm)	0	0	0	0
No. Slices	48	48	48	48
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	256 x 256	256 x 254	256 x 254	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	1.7	2	2
Fold-Over direction	RL	RL	RL	RL
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
Other				
Fat Suppression	Fat Sat	Fat Sat	Fat Sat	Fat Sat
Bandwidth	19.23 kHz	211 Hz/px	222 Hz/px	181 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time	00:30	00:30	00:30	00:30
Scan Time	02:43	06:12	05:24	05:17
Total Time (min)	03:13	06:42	05:54	05:47
Comments:	Phase FOV 0.75	Set parameter "image filter" at Weak		

Sequence - 2D FLAIR				
Study	CDIP – PCID v3.7			
Vendor	GE	Philips	Philips	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio
Version	22	R5	3.2.3	17
Sequence Name	2D FLAIR	2D FLAIR	2D FLAIR	2D TDF
Imaging Options	EDR, Asset, IR	Fast (Sense)	Fast (Sense)	iPat
Pulse Timing				
TE (ms)	140	125	125	123
TR (ms)	9000	9000	9000	9000
Flip Angle (°)	125	150	150	165
TI (ms)	2250	2500	2500	2500
Scan Range				
FOV (in-plane) (mm)	240 x 240	240 x 210	240 x 210	240 x 240
Slice thickness (mm)	3	3	3	3
Gap between slices (mm)	0	0	0	0
No. Slices	48	48	48	48
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	256 x 256	256x224	256x222	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.95 x 3	0.94 x 0.95 x 3	0.94 x 0.94 x 3
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	1	2	2	2
Fold-Over direction	RL	RL	RL	RL
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
Other				
Fat Suppression	None	None	None	None
Bandwidth	27.78 kHz	164 Hz/px	242 Hz/px	222 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time+	00:30	00:30	00:30	00:30
Scan Time	04:32	04:48	04:12	04:05
Total Time (min)	05:02	05:18	04:42	04:35
Comments:	Flip angle should be set and not left to the scanner to decide	Set parameter "image filter" at Weak		

Sequence- T2*				
Study	CDIP – PCID v3.7			
Vendor	GE	Philips	Philips	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio
Version	22	R5	3.2.3	
Sequence Name	GRE	FFE	FFE	GRE
Imaging Options	Asset	Sense	Sense	iPat
Pulse Timing				
TE (ms)	20	21	21	20
TR (ms)	650	650	650	650
Flip Angle (°)	20	20	20	20
TI (ms)	-	-	-	-
Scan Range				
FOV (in-plane) (mm)	240 x 240	240 x 240	240 x 240	240 x 240
Slice thickness (mm)	3	3	3	3
Gap between slices (mm)	0	0	0	0
No. Slices	48	48	48	48
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	256 x 256	256x256	256x254	256 x 256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	1	2	2	2
Fold-Over direction	RL	RL	RL	RL
Reconstruction				
Matrix size	256	256	256	256
Voxel size [L/R x A/P x I/S] (mm)	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3	0.94 x 0.94 x 3
Other				
Fat Suppression	None	None	None	None
Bandwidth (Hz/Px)	19.23 kHz	217 Hz/px	217 Hz/px	200 Hz/px
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time	00:30	00:30	00:30	00:30
Scan Time	02:15	04:13	04:18	03:04
Total Time (min)	02:45	04:43	04:48	03:34
Comments:	CV act_te = 20000 Phase FOV 0.75	Set parameter "image filter" at Weak		

Sequence - fMRI				
Study	CDIP – PCID v3.7			
Vendor	GE	Philips	Philips	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio
Version	22	R5	3.2.3	17
Sequence Name	fMRI EPI	FFE EPI	FFE EPI	fMRI EPI
Imaging Options	EDR,Fast Filtered, "eyes open"	CLEAR, SENSE, "eyes open"	CLEAR, SENSE, "eyes open"	"eyes open", iPat
Pulse Timing				
TE (ms)	30	30	30	30
TR (ms)	2400	2110	2110	2110
Flip Angle (°)	70	70	70	70
TI (ms)	-	-	-	-
Scan Range				
FOV (in-plane) (mm)	224 x 224	224 x 224	224 x 224	224 x 224
Slice thickness (mm)	3.5	3.5	3.5	3.5
Gap between slices (mm)	0	0	0	0
No. Slices	40	40	40	40
Acquisition				
Orientation	Oblique axial	Oblique axial	Oblique axial	Oblique axial
Matrix size	64 x 64	64 x 63	64 x 64	64 x 64
Voxel size [L/R x A/P x I/S] (mm)	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5
NEX	1	1	1	1
Acceleration factor (Parallel factor*)	2	2.1	2	2
Fold-Over direction	AP	AP	AP	AP
Reconstruction				
Matrix size	64	64	64	64
Voxel size [L/R x A/P x I/S] (mm)	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5	3.5 x 3.5 x 3.5
Other				
Fat Suppression	Fat Sat	Fat Sat. SPIR	Fat Sat. SPIR	Fat Sat.
Bandwidth (Hz/Px)	n/a	48.6	2441	2442
Number of acquisitions	250	300	300	300
Coil Type				
Head	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12
Timing				
Prescan Time+	00:30	00:30	00:30	00:30
Scan Time	10:00	10:39	10:39	10:41
Total Time (min)	10:30	11:09	11:09	11:11
Comments:		Please set parameter "dynamic stabilization" at : enhanced		

Sequence – DTI					
Study	CDIP – PCID v3.7				
Vendor	GE	Philips	Philips	Siemens	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T	3.0T
Model	Discovery	Ingenia	Achieva	Trio	Trio
version	22	R5	3.2.1	17	17
Sequence Name	DWI	DWI	DWI	DWI	DWI
Imaging Options	ASS	Sense	Sense	iPat	iPat
Pulse Timing					
TE (ms)	min (87.3)	(shortest) 107	(shortest) 100	96	96
TR (ms)	9000	(shortest) 9976	(shortest) 9931	9400	9400
Flip Angle (°)	90	90	90	90	90
TI (ms)	-	-	-	-	-
Scan Range					
FOV (in-plane) (mm)	256 x 256	256 x 256	256 x 256	256 x 256	256 x 256
Slice thickness (mm)	2	2	2	2	2
Gap between slices (mm)	0	0	0	0	0
No. Slices	70	70	70	70	70
Acquisition					
Orientation	Oblique axial	Oblique axial - With eyes out of the way	Oblique axial - With eyes out of the way	Oblique axial - With eyes out of the way	Oblique axial
Matrix size	128 x 128	128 x 126	128 x 128	128 x 128	128 x 128
Voxel size [L/R x A/P x I/S] (mm)	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2
NEX	1	1	1	1	1
Acceleration factor (Parallel factor*)	2	2	2	2	2
Fold-Over direction	AP	AP	AP	AP	AP
Reconstruction					
Matrix size	128	128	128	128	128
Voxel size [L/R x A/P x I/S] (mm)	2x2x2	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2	2 x 2 x 2

GE: T2 images (b0) = 3. If possible, place one at the beginning, one in the middle and one at the end / Make sure there is not interpolation. To avoid an automatic interpolation of data, please set control variable (CV). There are two ways of setting this CV, one with rhmethod = 1 or rmimsize = 128; both of these achieve the same end result.

Diffusion					
b-value 1	0	0	0	0	0
b-value 2	1000	1000	1000	1000	-
Number of directions	30	32	32	30	1
Other					
Fat Suppression	FatSat	FatSat / SPIR	FatSat / SPIR	FatSat	FatSat
Bandwidth (Hz/Px)	n/a			2056 Hz/px	2056 Hz/px
Coil Type					
Head	x	x	x	x	x
Channel	8-12 (HNS)	15 (Head and Neck)	8	12	12
Timing					
Prescan Time+	00:30	00:30	00:30	00:30	00:30
Scan Time	05:06	05:49	05:47	05:20	00:38
Total Time (min)	05:36	06:19	06:17	05:50	01:08
Comments:		Set parameter "directional resolution" at : OPT 32		Total 3 sequences (1 x DWI 30 directions + 2 DWI 1 Direction b=0) Total Time: 08:06 B02 +03 - DIFFUSION Mode: scan trace	

Sequence - Task fMRI									
Study	CIMA-Q Add-on								
Vendor	Philips	Philips	Philips	Philips	Philips	Philips	Siemens	Siemens	Siemens
Field Strength	3.0T	3.0T	3.0T	3.0T	3.0T	3.0T	3.0T	3.0T	3.0T
Model	Ingenia	Ingenia	Ingenia	Achieva	Achieva	Achieva	Trio	Trio	Trio
Version	R5	R5	R5	3.2.3	3.2.3	3.2.3	17	17	17
Sequence Name	FFE EPI	FFE EPI	B0 Map	FFE EPI	FFE EPI	B0 Map	fMRI EPI	fMRI EPI	GRE field mapping
Imaging Options									
Pulse Timing									
TE (ms)	25	25	4.6	25	25	4.6	25	25	4.92 / 7.38
TR (ms)	2500	2500	475	2500	2500	475	2500	2500	476
Flip Angle (°)	90	90	60	90	90	60	90	90	60
TI (ms)	-	-	-	-	-	-	-	-	-
Scan Range									
FOV (in-plane) (mm)	240 x 240	240 x 240	240 x 240	240 x 240	240 x 240	240 x 240	222 x 222	222 x 222	222 x 222
Slice thickness (mm)	3	3	3	3	3	3	3	3	3
Gap between slices (mm)	0.3	0.3	0.3	0.3	0.3	0.3	0	0	0
No. Slices	41	41	41	41	41	41	41	41	45
Acquisition									
Orientation	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°	AC-PA minus 20°
Matrix size	80 x 80	80 x 80	80 x 80	80x79	80x79	80 x 80	74	74	74
Voxel size [L/R x A/P x I/S] (mm)	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3
NEX	1	1	1	1	1	1	1	1	1
Acceleration factor (Parallel factor*)	1.8	1.8	1	1.3	1.3	1	1	1	1
Fold-Over direction	AP	First AP / Second PA	AP	AP	First AP / Second PA	AP	AP	First AP / Second PA	AP
Reconstruction									
Matrix size	80	80	80	64	64	80	74	74	74
Voxel size [L/R x A/P x I/S] (mm)	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3	3 x 3 x 3

Other									
Fat Suppression	Fat Sat. SPIR	Fat Sat. SPIR	None	Fat Sat. SPIR	Fat Sat. SPIR	None	Fat Sat.	Fat Sat.	None
Bandwidth (Hz/Px)	39.1	39.1	294.8	25.2	25.2	294.8	2502	2502	268
Number of acquisitions	300	4	-	300	4	-	310	4	-
Coil Type									
Head	x	x	x	x	x	x	x	x	x
Channel	15 (Head and Neck)	15 (Head and Neck)	15 (Head and Neck)	8	8	8	12	12	12
Timing									
Prescan Time+	00:30	00:30	00:30	00:30	00:30	00:30	00:30	00:30	00:30
Scan Time	12:35	00:17	01:17	12:35	00:17	01:17	13:03	00:17	01:17
Total Time (min)	13:05	00:47	01:47	13:05	00:47	01:47	13:33	00:47	01:47
Comments:	Tested 22-AVR-15	Tested 22-AVR-15	Tested 22-AVR-15	Tested 10-AVR-15	Tested 10-AVR-15	-	Tested 10-MAR-15	Tested 10-MAR-15	Tested 10-MAR-15
	Core task sequence - need to be synchronized with e-Prime paradigm	Need to be done twice : Once with AP phase direction and after PA phase direction. Sequences for geometric distorsion correction	Please acquire B0 Field Map after those three EPI sequences	Core task sequence - need to be synchronized with e-Prime paradigm	Need to be done twice : Once with AP phase direction and after PA phase direction. Sequences for distorsion correction	Please acquire B0 Field Map after those three EPI sequences	Core task sequence - need to be synchronized with e-Prime paradigm	Need to be done twice : Once with AP phase direction and after PA phase direction. Sequences for distorsion correction	Please acquire Gre Field Map after those three EPI sequences

SCAN INFORMATION FORM

MRI Dataset Name: _____ **Type of Data:** ☐ **Living Human** ☐ **Human Phantom** ☐ **Geometric Phantom**

Site Name: _____ **Total Duration of Session:** _____**h** _____**min**

MRI Operator Name: _____ **Scan Date: (DD-MON-YYYY)** _____ - _____ - _____

CIMA-Q

Following section: To be completed by **MR technologist**

Use CDIP approved sequences for all CIMA-Q scans. Please review the scan for motion and artifacts. Make sure 3D-T1w and FLAIR are well acquired before scanning following sequences. Re-acquire if necessary. Refer to CIMAQ Manuel Scan procedure for detailed instructions.

LORIS SUPPORTS ONLY CLASSIC DICOM, DO NOT EXPORT DATA IN ANY OTHER FORMAT (i.e ENHANCED DICOM)

Sequences	**Acquired ?**			**Nb of attempts**	**Comments** (e.g. subject woke up, repeated series #, motion)
	Yes	Partial	No		
3D-T1w					
FLAIR					
Dual PD/T2					
T2*					
DTI					
DWI B0 AP					
DWI B0 PA					
Connectivity fMRI					
Activation task					
Bold AP					
Bold PA					
Field Map					

****Keep this copy for your own record.****

Annex 6: Phantom Technical Information

PLEASE READ AND UNDERSTAND BEFORE USING THE PHANTOM

IMPORTANT INFORMATION AND INSTRUCTIONS

STORE THIS DOCUMENT WITH THE PHANTOM

Description:

The phantom container is made of poly-carbonate and was sealed with commercial water-resistant epoxy. The phantom contains 129 2x4 DUPLO® bricks, 15 2x2 bricks and 4 2x4 half-bricks and filled with 7.5 litres of aqueous solution containing in total approximately 0.15 grams of manganese chloride and 21 grams of sodium chloride. Bottom part of the phantom also contains a plastic vial filled with 5ml of another solution containing approximately less then 0.1 milligram of manganese chloride and 14 milligram of sodium chloride.

- Manganese chloride is a toxic substance and affects the human respiratory system when ingested in significant quantities. Please review the enclosed material safety data sheets.
- Sodium chloride may irritate skin and eyes on contact. Please review the enclosed material safety data sheets.

Handling:

The phantom is heavy (weighing around 8 kilograms) and may cause injury to personnel or damage to property if mishandled or dropped. The phantom container and phantom contents may shatter if dropped. Please exercise caution when carrying or handling the phantom.

- A person handling the phantom should be able to comfortably carry and handle the 8 kilogram phantom.
- Always carry the phantom from its bottom, holding it stably with two hands.
- Make sure the phantom is clean and dry before carrying or handling the phantom.
- Do not carry or manipulate the phantom by holding the container lid.
- Do not apply excessive pressure or force to the top, bottom, and sides of the phantom or the plastic cap on the lid.
- Do not pull, twist, or tug at the phantom container lid.
- Inspect phantom for leaks before and after each handling

Storage:

- Keep phantom in controlled temperature environment, ideally between 15 to 25 degrees Celsius (590F – 770F).
- Please store phantom in upright position.
- Do not stack items on top of the phantom.

Fisher Scientific
CANADA
A Fisher Scientific International Company

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Identification:

- Key: 88295
- Name: Manganese chloride 1.0M solution

Catalog Numbers:

BP541-1, BP541-100

Synonyms:

- Manganese(II) chloride in solution; Manganese dichloride in aqueous
- solution; Manganous chloride solution.

Company Identification:

Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410

For information, call:

- 201-796-7100

Emergency Number:

- 201-796-7100

For CHEMTREC assistance, call:

- 800-424-9300

For International CHEMTREC assistance, call:

- 703-527-3887

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS #	Chemical Name	%	EINECS #
7732-18-5	Water	87.5	231-791-2
7773-01-5	Manganese chloride	12.5	231-869-6

Text for R-phrases: see Section 16

Hazard Symbols: XN

Risk Phrases: 22

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance: light pink clear liquid. Warning! May be harmful if swallowed. May cause central nervous system effects. Causes eye, skin, and respiratory tract irritation.

Target Organs: Central nervous system, lungs, reproductive system.

POTENTIAL HEALTH EFFECTS

Eye: Causes eye irritation. May cause chemical conjunctivitis.

Skin: Causes skin irritation.

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system effects and/or neurological effects. In high doses, manganese may increase anemia by interfering with iron absorption.

Inhalation: Causes respiratory tract irritation. The lowest exposure concentration of manganese at which early effects on the CNS and the lungs may occur is still unknown. However, once neurological signs are present, they tend to continue and worsen after exposure ends.

Chronic: Chronic inhalation or ingestion may result in manganism characterized by neurological symptoms such as headache, apathy, and weakness of the legs, followed by psychosis and neurological symptoms similar to those of Parkinson's disease. May impair fertility. Other chronic effects from inhaling high amounts of manganese include an increased incidence of cough and bronchitis and susceptibility to infectious lung disease.

SECTION 4 - FIRST AID MEASURES

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively. Persons with impaired respiratory function or anemia may be at increased risk to the hazards associated with this substance.

SECTION 5 - FIRE FIGHTING MEASURES

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits, lower: Not available.

Explosion Limits, upper: Not available.

NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation.

SECTION 7 - HANDLING AND STORAGE

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Avoid contact with eyes, skin, and clothing. Do not breathe dust, vapor, mist, or gas. Keep container tightly closed. Do not ingest or inhale.

Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

EXPOSURE LIMITS

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Water	none listed	none listed	none listed
Manganese chloride	0.2 mg/m3 TWA (asMn) (listedunder ** no name**).	1 mg/m3 TWA (asMn) (listedunder ** no name**).500 mg/m3IDLH (as Mn)(listed under **no name **).	5 mg/m3 Ceiling(as Mn)(listed under** no name **).

OSHA Vacated PELs:

Water: No OSHA Vacated PELs are listed for this chemical.

Manganese chloride: No OSHA Vacated PELs are listed for this chemical.

PERSONAL PROTECTIVE EQUIPMENT

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Clear liquid

Color: light pink

Odor: odorless

pH: Not available.

Vapor Pressure: Not available.

Vapor Density: Not available.

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: Not available.

Freezing/Melting Point: Not available.

Decomposition Temperature: Not available.

Solubility in water: Not available.

Specific Gravity/Density: Not available.

Molecular Formula: Solution

Molecular Weight: 0

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Excess heat.

Incompatibilities with Other Materials: Strong reducing agents, zinc, potassium, hydrogen peroxide, sodium.

Hazardous Decomposition Products: Hydrogen chloride, irritating and toxic fumes and gases, oxides of manganese.

Hazardous Polymerization: Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

RTECS#:

- CAS# 7732-18-5: ZC0110000
- CAS# 7773-01-5: OO9625000

LD50/LC50:

- CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg.
- CAS# 7773-01-5: Oral, mouse: LD50 = 1031 mg/kg; Oral, mouse: LD50 = 450 mg/kg; Oral, rat: LD50 = 250 mg/kg. Not available.

Carcinogenicity:

Water -

- Not listed by ACGIH, IARC, or NTP.

Manganese chloride -

- Not listed by ACGIH, IARC, or NTP.

Epidemiology:

The U.S. EPA stated that epidemiological studies of inorganic manganese compounds in humans indicate effects on the respiratory system at levels below 1 mg/m3.

Teratogenicity:

No data available.

Reproductive Effects:

Men exposed to manganese dusts showed a decrease in fertility.

Neurotoxicity:

Manganese is neurotoxic.

Mutagenicity:

No data available.

Other Studies:

No data available.

SECTION 12 - ECOLOGICAL INFORMATION

SECTION 13 - DISPOSAL CONSIDERATIONS

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

SECTION 14 - TRANSPORT INFORMATION

US DOT

- No information available

Canadian TDG

- No information available.

SECTION 15 - REGULATORY INFORMATION

US FEDERAL

TSCA

- CAS# 7732-18-5 is listed on the TSCA inventory.
- CAS# 7773-01-5 is listed on the TSCA inventory.

Health & Safety Reporting List

- None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

- None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

- None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

- None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

- None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

- None of the chemicals in this product have a TPQ.

Section 313

- This material contains Manganese chloride (listed as ** undefined **), 12 5%, (CAS# 7773-01-5) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act:

- CAS# 7773-01-5 listed as ** no name ** is listed as a hazardous air pollutant (HAP).
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

- None of the chemicals in this product are listed as Hazardous Substances under the CWA.
- None of the chemicals in this product are listed as Priority Pollutants under the CWA.
- None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

- None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Water is not present on state lists from CA, PA, MN, MA, FL, or NJ.

Manganese chloride can be found on the following state right to know lists: California, (listed as ** no name **), Pennsylvania, (listed as ** no name **), Minnesota, (listed as ** no name **).

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

- Hazard Symbols: XN
- Risk Phrases:
  - R 22 Harmful if swallowed.

- Safety Phrases:

WGK (Water Danger/Protection)

- CAS# 7732-18-5: No information available.
- CAS# 7773-01-5: 1

United Kingdom Occupational Exposure Limits

- CAS# 7773-01-5: OES-United Kingdom, TWA (listed as ** undefined **): 5 mg/m3 TWA (as Mn)

United Kingdom Maximum Exposure Limits

- CAS# 7773-01-5: MEL-United Kingdom, TWA (listed as ** undefined **): 0.5 mg/m3 TWA

Canada

- CAS# 7732-18-5 is listed on Canada's DSL List.
- CAS# 7773-01-5 is listed on Canada's DSL List.
- This product has a WHMIS classification of D2B.
- CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
- CAS# 7773-01-5 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

- CAS# 7773-01-5: OEL-AUSTRALIA:TWA 5 mg(Mn)/m3 JANUARY 1993
- OEL-BELGIUM:TWA 5 mg(Mn)/m3 JANUARY 1993
- OEL-CZECHOSLOVAKIA:TWA 2 mg(Mn)/m3;STEL 6 mg(Mn)/m3 JANUARY 1993
- OEL-DENMARK:TWA 2.5 mg(Mn)/m3 JANUARY 1993
- OEL-FINLAND:TWA 2.5 mg(Mn)/m3 JANUARY 1993
- OEL-HUNGARY:TWA 0.3 mg(Mn)/m3;STEL 0.6 mg(Mn)/m3 JANUARY 1993
- OEL-JAPAN:TWA 0.3 mg(Mn)/m3 JANUARY 1993
- OEL-THE NETHERLANDS:TWA 1 mg(Mn)/m3 JANUARY 1993
- OEL-POLAND:TWA 0.3 mg(Mn)/m3 JANUARY 1993
- OEL-SWEDEN:TWA 1 mg(Mn)/m3;STEL 2.5 mg(Mn)/m3 (resp. dust)
- OEL-SWEDEN:TWA 2.5 mg(Mn)/m3;STEL 5 mg(Mn)/m3 (total dust)
- OEL-UNITED KINGDOM:TWA 5 mg(Mn)/m3 JANUARY 1993 OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

SECTION 16 - ADDITIONAL INFORMATION

MSDS Creation Date: 6/30/1999, Revision #4 Date: 9/02/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name Sodium Chloride

Product Code XX0778

Effective Date 3/3/2003

Manufacturer EMD Chemicals Inc.
P.O. Box 70
480 Democrat Road
Gibbstown, NJ 08027
Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.

For More Information Call
856-423-6300 Technical Service
Monday-Friday: 8:00 AM - 5:00 PM

In Case of Emergency Call
800-424-9300 CHEMTREC (USA)
613-996-6666 CANUTEC (Canada)
24 Hours/Day: 7 Days/Week

Synonym SALT; HALITE
Material Uses Analytical reagent.
Chemical Family Inorganic salt.

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
SODIUM CHLORIDE	7647-14-5	100

Section 3. Hazards Identification

Physical State and Appearance Solid. (Granular solid. Crystals solid.)

Emergency Overview CAUTION!
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE DAMAGE TO THE FOLLOWING ORGANS: SKIN, EYES, STOMACH.

Routes of Entry Inhalation. Ingestion.

Potential Acute Health Effects

Eyes May be hazardous in case of eye contact (irritant).

Skin May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Inhalation Non-hazardous in case of inhalation.

Ingestion Non-hazardous in the case of ingestion.

Potential Chronic Health Effects

Carcinogenic Effects This material is not known to cause cancer in animals or humans.

Additional information See Toxicological Information (section 11)

Medical Conditions Aggravated by Overexposure: Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4. First Aid Measures

Eye Contact Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Inhalation If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 5. Fire Fighting Measures

Flammability of the Product Non-flammable.

Auto-ignition Temperature Not applicable.

Flash Points Not applicable.

Flammable Limits Not applicable.

Products of Combustion Not available.

Fire Hazards in Presence of Various Substances Not applicable.

Explosion Hazards in Presence of Various Substances

Risks of explosion of the product in presence of static discharge: No.

Risks of explosion of the product in presence of mechanical impact: No.

Fire Fighting Media and Instructions Not applicable.

Protective Clothing (Fire) Not applicable.

Special Remarks on Fire Hazards Not available.

Special Remarks on Explosion Hazards Not available.

Section 6. Accidental Release Measures

Small Spill and Leak Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill and Leak Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Spill Kit Information No specific spill kit reqired for this product.

Section 7. Handling and Storage

Handling Avoid contact with eyes, skin and clothing. Do not ingest.

Storage Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8. Exposure Controls/Personal Protection

Engineering Controls Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection

Eyes Splash goggles.

Body Lab coat.

Respiratory Dust respirator. Be sure to use an approved/certified respirator or equivalent.

Hands Gloves.

Feet Not applicable.

Protective Clothing (Pictograms)

Personal Protection in Case of a Large Spill Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
SODIUM CHLORIDE	Not available.

Section 9. Physical and Chemical Properties

Odor Odorless.

Color White.

Physical State and Appearance Solid. (Granular solid. Crystals solid.)

Molecular Weight 58.44 g/mole

Molecular Formula ClNa

pH Not available.

Boiling/Condensation Point 1430.9°C (2607.6°F)

Melting/Freezing Point 800.9°C (1473.6°F)

Specific Gravity Not available.

Vapor Pressure Not available.

Vapor Density Not available.

Odor Threshold Not available.

Evaporation Rate Not available.

LogKow Not available.

Solubility Soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity The product is stable.

Conditions of Instability Not available.

Incompatibility with Various Substances Not available.

Rem/Incompatibility Not available.

Hazardous Decomposition Products Not available.

Hazardous Polymerization Will not occur.

Section 11. Toxicological Information

RTECS Number:

Sodium Chloride VZ4725000

Toxicity Acute oral toxicity (LD50): 3000 mg/kg [Rat].
Acute toxicity of the vapor (LC50): >42000 mg/m3 1 hour(s) [Rat].

Chronic Effects on Humans Contains material which may cause damage to the following organs: skin, eyes, stomach.

Acute Effects on Humans May be hazardous in case of eye contact (irritant). May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Non-hazardous in case of inhalation. Non-hazardous in the case of ingestion.

Synergetic Products (Toxicologically) Not available.

Irritancy Draize Test (Rabbit):
Eye: 100mg/24h. Reaction: Moderate.
Skin: 500 mg/24h mild

Sensitization Not available.

Carcinogenic Effects This material is not known to cause cancer in animals or humans.

Toxicity to Reproductive System Tests on laboratory animals for reproductive effects are cited in Registry of Toxic Effects on Chemical Substances (RTECS).

Teratogenic Effects Not available.

Mutagenic Effects Tests on laboratory animals for mutagenic effects are cited in Registry of Toxic Effects of Chemical Substances

(RTECS).

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Toxicity of the Products of Biodegradation	The product itself and its products of degradation are not toxic.

Section 13. Disposal Considerations

EPA Waste Number	Not available.
Treatment	Material does not have an EPA Waste Number and is not a listed waste, however consultation with a permitted waste disposal site (TSD) should be accomplished. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations.

Section 14. Transport Information

DOT Classification	Not available.
TDG Classification	Not available.
IMO/IMDG Classification	Not available.
ICAO/IATA Classification	Not available.

Section 15. Regulatory Information

U.S. Federal Regulations	TSCA 8(b) inventory: SODIUM CHLORIDE SARA 302/304/311/312 extremely hazardous substances: No products were found. SARA 302/304 emergency planning and notification: No products were found. SARA 302/304/311/312 hazardous chemicals: SODIUM CHLORIDE SARA 311/312 MSDS distribution - chemical inventory - hazard identification: SODIUM CHLORIDE: Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard SARA 313 toxic chemical notification and release reporting: No products were found. Clean Water Act (CWA) 307: No products were found. Clean Water Act (CWA) 311: No products were found. Clean air act (CAA) 112 accidental release prevention: No products were found. Clean air act (CAA) 112 regulated flammable substances: No products were found. Clean air act (CAA) 112 regulated toxic substances: No products were found.
WHMIS (Canada)	Not controlled under WHMIS (Canada). CEPA DSL: SODIUM CHLORIDE This product has been classiifed in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.
International Regulations	
EINECS	SODIUM CHLORIDE 231-598-3
DSCL (EEC)	R36/38- Irritating to eyes and skin.
International Lists	Australia (NICNAS): SODIUM CHLORIDE Japan (MITI): SODIUM CHLORIDE Korea (TCCL): SODIUM CHLORIDE Philippines (RA6969): SODIUM CHLORIDE China: No products were found.
State Regulations	No products were found. California prop. 65: No products were found.

Section 16. Other Information

National Fire Protection Association (U.S.A.)

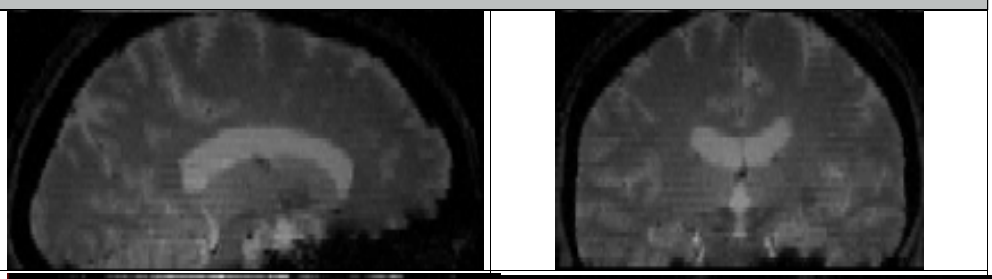
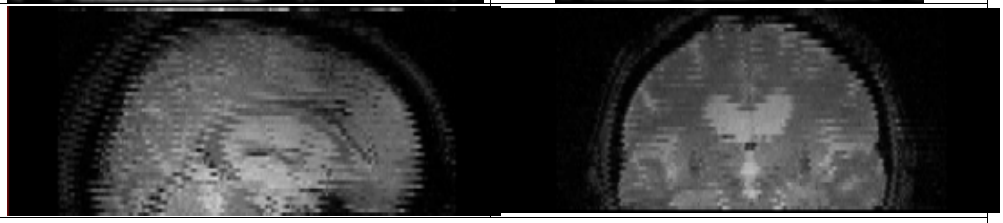
	0	**Fire Hazard**
Health	**0 0**	**Reactivity**
		Specific Hazard

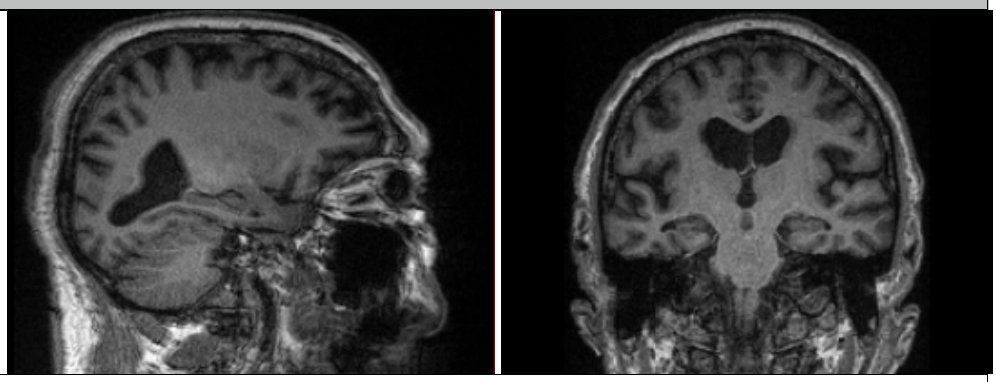
Changed Since Last Revision +

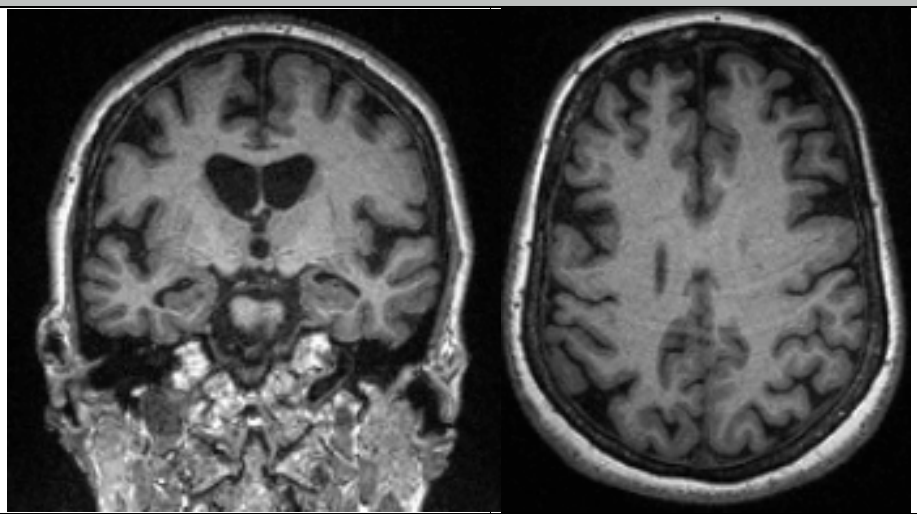
Notice to Reader

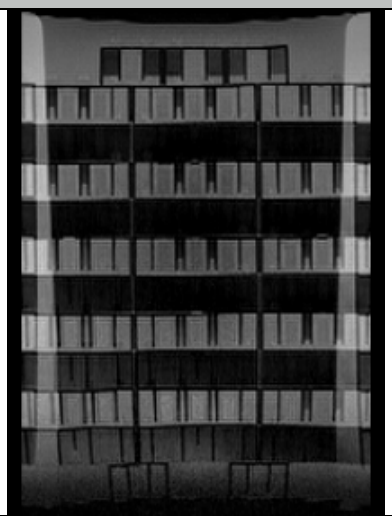
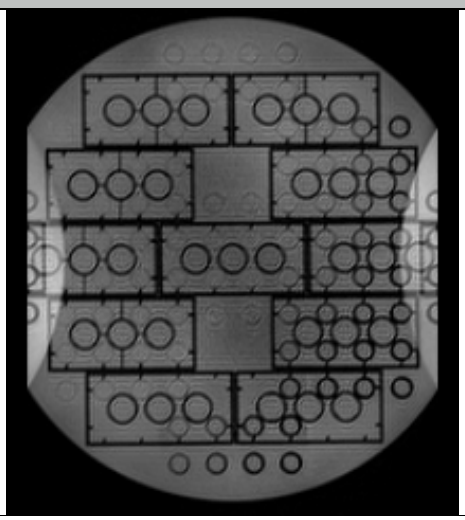
The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

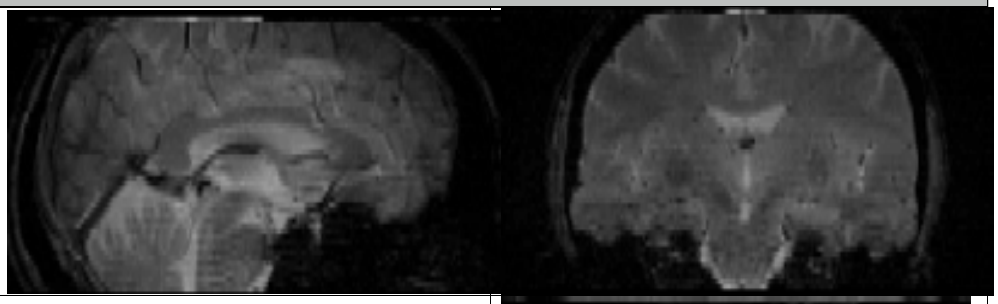
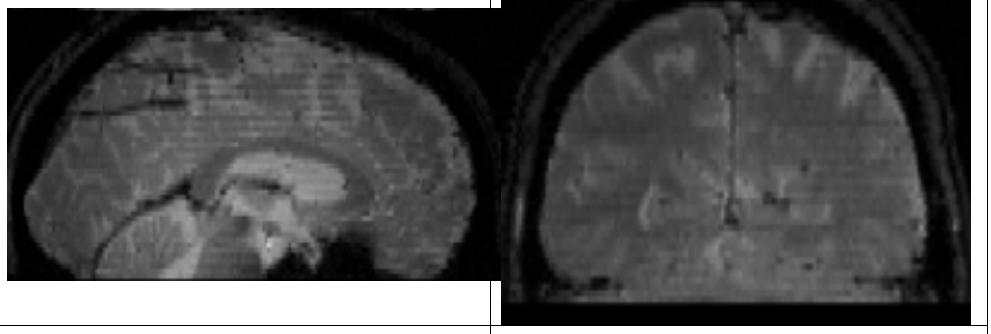
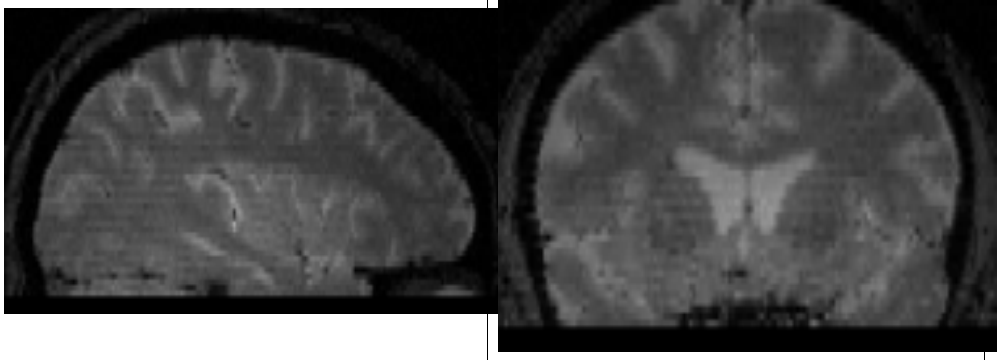
Annex 7: Quality control artefact examples

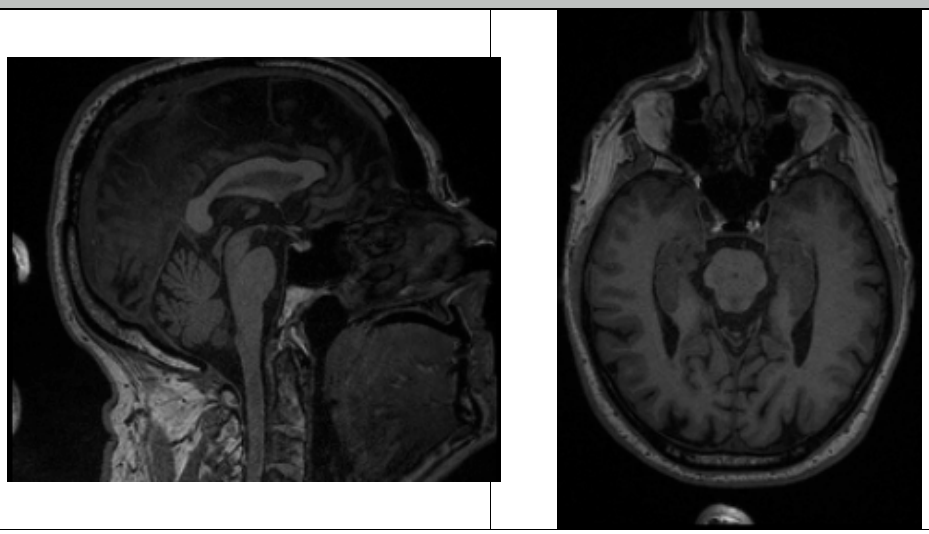
Artifact: in between packet movement	
Slight movement	
Severe movement	
Recommended fix: Repeat sequence and remind participant to avoid any movements during scan. Place sponges on each side of the head to stabilize.	

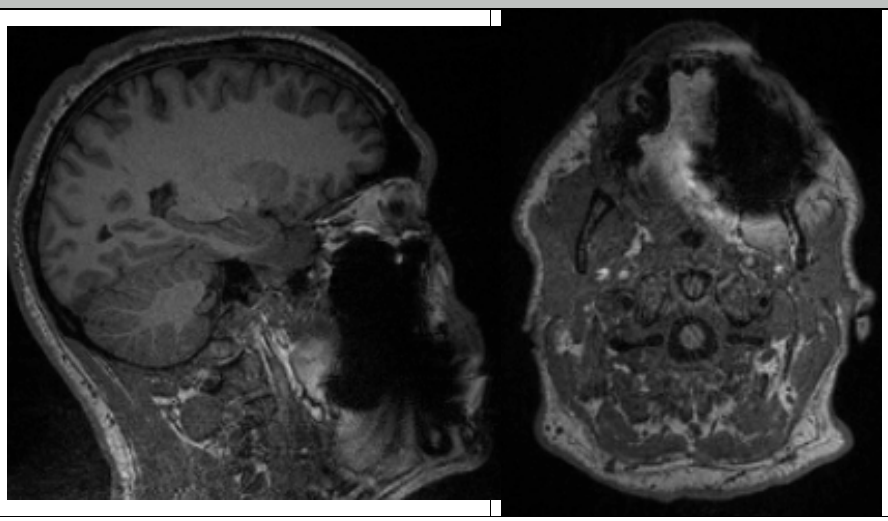
Artifact: noisy scan	
Slight noise	
Recommended fix: Make sure the coil is well connected and that you are using the CDIP – CIMAQ imaging protocol	

Artifact: ringing artifact	
Severe ringing	
Recommended fix: Make sure participant didn't move. If a FAT saturation is required, make sure it is set.	

Artifact: sagittal ghosts		
Sagittal ghosts		
Recommended fix: Open FOV to include all structures or set phase oversampling to avoid signal from structures outside FOV.		

Artifact: coverage		
Top of brain cut off		
Base of cerebellum cut off		
Base of temporal lobe cut off		
Recommended fix: Replace acquisition box to cover: top of the brain, cerebellum and the inferior part of temporal lobe. If necessary, add slices to cover all structures needed.		

Artifact: wrap-around	
Medium AP wrap around, no effect on brain	
Recommended fix: Open FOV to include all structures in AP direction.	

Artifact: susceptibility	
Susceptibility due to dental work	
Recommended fix: Dentures should be removed before MR session. If dental works are fixed and cause artifacts on brain, place a saturation band on.	